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**FIRE
MANAGEMENT
PLAN**

**USDA FOREST SERVICE
NORTHERN REGION
KOOTENAI NATIONAL FOREST
TROY RANGER DISTRICT**

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PREFACE

This fire planning project was conceived in October of 1977 by Dan W. Bailey, Fire Management Officer, with assistance and support from Charles Jones, Resource Supervisory Forester, and Denis Hart, Silviculturist. Also, William Fischer, Research Forester from the Northern Forest Fire Lab in Missoula, was instrumental in the early stages of the project.

The original plan was termed a fuels management plan. Later in February of 1978, it was changed to the Troy Fire Management Plan to coincide with the revised National Fire Management Policy.

On June 5, 1978, Kathleen Davis was hired as Fire Planning Specialist, to write the fire management plan. Kathy's expertise in fire management planning and fire ecology, and her ability to work with all disciplines in the development of the plan were instrumental in the high level job accomplished. Her dedication, enthusiasm, initiative, and professionalism in development of this plan was outstanding. All of us on the District and Forest appreciate the excellent job.

Sincere thanks and good luck in the National Park Service.

ACKNOWLEDGEMENTS

Many people contributed to the development of the Troy Fire Management Plan. Their support and assistance was greatly appreciated and helped us accomplish a comprehensive fire management plan.

Sincere thanks goes to William Fischer, RD&A Program, Northern Forest Fire Laboratory, for his guidance and involvement throughout the project. Bjorn Dahl, Troy District Ranger, provided the interest and willingness to initiate this project on the District. Without Bjorn's support, this project could not have been realized.

We are indebted to the clerical staff for their skill and patience with the typing and retyping of the fire plan. Special thanks goes to Betty Martensen, Dona Wilson, Hazel Sanders, Joyce Olson, Jane Bain, Cecilie Stephens, and Karen Obermayer on the Troy District and Nita Hoeldt in the S.O.

Lance Schelvan, Forest Illustrator, designed the cover page.

The following people provided support, consultation, and technical advice. Our sincere appreciation goes to them for their time and interest.

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Our sincere thanks to you all.

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UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE
ENVIRONMENTAL ASSESSMENT REPORT
TROY RANGER DISTRICT FIRE MANAGEMENT PLAN

Kootenai National Forest, Northern Region

Troy Ranger District

Lincoln County, Montana; Boundary County and Bonners County, Idaho



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Abstract: This Environmental Assessment Report describes two alternatives for the fire management program. The alternatives are evaluated and the preferred choice is identified. The reason that an Environmental Statement will not be prepared is included.

RECORD OF DECISION

Proposed Project: Troy Fire Management Plan
Ranger District: Troy Ranger District
Report Prepared By: Kathleen M. Davis
Fire Planning Specialist

District Interdisciplinary Review

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I. INTRODUCTION

A. Decision

Since 1935 fire control has been guided by an immediate suppression policy which often resulted in large expenditures to minimize acreage burned and did not acknowledge the natural role of fire in biotic and abiotic systems. In February 1978, the Forest Service revised its National Forest Fire Management Policy. The revised policy states that the Forest Service shall provide will planned and executed fire protection and fire use programs that are cost effective and responsive to resource management objectives. Fire management objectives will be based on resource objectives.

The decision to be made is whether to implement the Troy Fire Management Plan or continue with the "10 a.m." total suppression policy till 1983. Implementation of the revised policy has begun on test forests and will be completed nationally by 1983 for all National Forest lands.

B. Description of Area

The entire Troy Ranger District will be included in the fire management plan. There are 324,637 acres (131,380 ha) of National Forest land and an additional 34,051 acres (13,780 ha) of state and private land within the District boundary. Approximately one-fifth of the National Forest land is in Idaho. Other Districts on the Kootenai National Forest lie to the north, east, and south. The Idaho Panhandle National Forest is to the west. A map of the District is included in the Troy Fire Plan.

II. AFFECTED ENVIRONMENT

The biological communities will be most influenced by implementation of the Troy Fire Plan. The effects are considered beneficial to plant and animal populations as a whole because of the creation and maintenance of diverse habitats. The physical, economic, and social factors may be affected locally. The influence on all factors will be discussed in IV. Evaluation of Alternatives.

III. EVALUATION CRITERIA

A. Guiding Documents

Evaluation of this proposal will be consistent with guidelines set forth in Forest Service Manuals (Revised Fire Management Policy FSM 5103), the Kootenai National Forest Land Use Plans, Cabinet Mountains Wilderness Interim Management Plan, the 1964 Wilderness Act, and the Clean Air Act (PL 88-206).

B. Objectives

The objectives used to evaluate the alternatives are:

1. Implement the revised fire management policy now on the Troy Ranger District and the Kootenai National Forest.
2. Implement fire management practices based on land and resource management objectives defined in the land use planning process.
3. Return the natural role of fire to certain areas in the environment.
4. Provide a strong fire protection force when needed.
5. Develop a cost-effective fire management program thereby reduce suppression costs.
6. Develop a model for the Forest and Region to use as an example for fire management planning.

IV. ALTERNATIVES CONSIDERED

A. Implement the Troy Fire Management Plan

Identify fire management areas on the District and allow unplanned fires (either man-caused or lightning) to burn when they fit predetermined prescription criteria and are approved by the Management Fire Committee, District Ranger, and Forest Supervisor. In the wilderness, only lightning fires will be allowed. The Troy Fire Plan also identifies uses for prescribed fire and the need for wildfire suppression. Prescribed fire projects will be covered in separate documents such as EAR's for timber sales and wildlife habitat burns.

Fires which do not endanger human life and property and which burn in designated areas under specified conditions will be allowed to burn. This alternative is a logical approach to returning fire to natural ecosystems with minimal adverse impact. It will produce some short-termed impacts such as smoke and blackened landscapes; however, the long-termed benefits of diverse plant and animal communities and stable ecosystems will be realized.

B. Continue with a Total Suppression Policy

Continued total suppression is not in accordance with the revised fire policy. This type of fire management has not proven to be cost effective and, more importantly, does not recognize fire as an integral factor of natural systems.

Alternative B minimizes the short-termed impact of allowing fires to burn. However, fuels accrue with time, and in the absence of periodic fires, heavy continuous fuel concentrations increase the probability of large uncontrollable fires. This approach would result in severe large area wildfires at long intervals.

V. EFFECTS OF IMPLEMENTATION

The effects on the environment are described at once for both alternatives. This is done to draw comparisons when addressing each factor and to avoid repetition. Some of these considerations are discussed in the Troy Fire Management Plan, Section VI, Prescription Criteria.

For most of the environmental factors, references are given which provide detailed information about the effects of all types of fire.

A. Air Quality

Smoke often is the most visible and potentially the most controversial feature of fire because it affects the air resource within a fire management area and outside its boundaries. Smoke movement is principally eastward, and the valleys around Troy and Libby are sensitive areas during periods when dispersal is poor, usually in the autumn.

Air quality in the vicinity of a fire may be lowered for a short time when management fires are allowed to burn. However, smoke impacts would occur with the continuation of the total suppression policy because of fireplace burning, lumber mills, slash burning, and wildfires. Because of fuel buildups, the potential of smoke impacts increases as attempts are made to keep fire out of natural systems.

The fire management policy acknowledges smoke sensitive areas. The impact of smoke on airsheds will be evaluated at the time a management fire starts and daily while it is burning. If one or more fires create unacceptable smoke loads, it will be necessary to take partial or total suppression action. Smoke management will be consistent with the Clean Air Act (PL 88-206) and standards set by the Montana Air Quality Bureau and local airshed coordinators.

(Went 1960, Frazier 1967, Rasmussen and Went 1967, Robinson and Robbins 1968, Beaufait 1971, Hall 1972, Coleman 1973, Hemeon 1973, Kramlich et al. 1973, Cramer 1974, USDA Forest Service 1976, Paulson et al. 1978)

B. Water

Fire indirectly affects the water resource through its influence on vegetation and soil. The effect is very dependent on fire size, severity, location, and season of occurrence, therefore, the impact on water quality and quantity varies with each fire.

Killing or consuming vegetation can augment streamflow by increasing runoff and promote erosion by exposing soil to precipitation and overland flow. Generally a large area in a watershed must be burned by a severe fire before increased stream flow and erosion can be measured. If the vegetation is defoliated but not killed, any water yield increase will be temporary. Onsite erosion potential will decrease rapidly as herbs and shrubs recover the burned site. Increased runoff and the change in timing of snow-melt could be longer lasting effects.

Vegetation along a stream stabilizes the channel and protects the stream from debris and sediment. A stand-destroying fire in the riparian zone can have a very detrimental effect on the water resource. Nutrients released by the burned vegetation may enter streams through leached minerals, soil movement, and wind-blown ash. The actual quantity and type of nutrients existing after a fire will vary with the fire intensity, vegetation consumed, and soil factors.

Maintaining a total suppression policy has compounding effects. The amount of ash nutrient released and runoff would be low; however, the potential increases because of the higher risk of wildfires.

Effects on the water resource are not expected to be significantly adverse by implementing the fire plan because of the burning prescriptions. Low to moderate intensity fires do not greatly reduce the vegetative cover and duff/litter layers. Any changes are expected to be short-lived and within the tolerable limits of the drainages.

The water resource is severely impacted by wildfires. Both fire policies strive for immediate control of wildfires to minimize the acreage burned.

(Behan 1970, Hynes 1972, Bethalamy 1974, USDA Forest Service 1976)

C. Soils

Primarily, soils are indirectly affected by fire's influence on vegetation and organic matter and by its potential to alter the physical and chemical environment with elevated temperatures. Fire is a chief agent of nutrient cycling and energy flow through

its ability to release nutrients held in combustible organic substances. These processes may be obstructed when accumulated biomass creates an environment unfavorable to decomposing organisms. A dramatic loss of plant and litter cover will adversely affect soil through leaching, movement, and increased insolation. Both fire policies maintain wildfire suppression to avert severe damage.

Physical properties of soil are not expected to be significantly altered by the fire management plan except possibly where heavy fuels burn with a high intensity for a long time. In such cases, hard pans and changes in soil structure or water repellancy may develop, but they would occur only where local concentrations of heavy fuels burn. Management fires would enhance the chemical properties by releasing nutrients.

The effects on chemical and physical properties depend on the fuel situation, fire frequency and behavior, specific soil characteristics, climatic factors, and biotic influences. In some vegetation types, fire suppression has augmented fuel situations, thereby increasing the likelihood of severe fires and, consequently, soil damage. Allowing fires to burn during prescribed conditions will create a fuel mosaic and reduce the potential damage to soils.

(Ahlgren and Ahlgren 1960, Behan 1970, Ralston and Hatchell 1971, Stone 1971, Wells 1971, Davis 1972, Wright and Heinselman 1973, Bethalamy 1974, Clayton 1975, USDA Forest Service 1976)

D. Vegetation

The ecological importance of fire to plant communities of the Troy District cannot be exaggerated. Fire recycles vegetation, controls species composition and structure, sanitizes the forest by cleaning up diseased and infected vegetation and concentrations of fallen timber, and rejuvenates decadent vegetation. Fire has had more influence than any other single factor or combination of factors and has been an innate feature of the ecosystem for thousands of years. It is primarily responsible for the diverse plant communities existing today.

Restoring fire to the management areas accepts the probability of damage to vegetation. This may be short-lived for resprouting undergrowth species, but it is anticipated that some trees and undergrowth plants will be killed. The overall effect of allowing fires to burn will be to create a mixture of successional stages and types of vegetation cover, thereby increasing the diversity of the landscape and enhancing the stability of the ecosystem. There are no known threatened or endangered plant species that would be adversely affected.

Theoretically, successful fire suppression would promote homogeneous climax plant communities, thereby eliminate seral species. A serious ramification of little vegetative diversity would be the disappearance of wildlife species which depend on seral communities for habitat requirements. Logging and prescribed fire would create diversity in a limited area, but the fire plan would affect plant communities throughout the District.

(Ahlgren and Ahlgren 1960, Cooper 1961, Odum 1969, Loucks 1970, Mutch 1970, 1974, Wellner 1970, Heinselman 1971, Habeck and Mutch 1973, Taylor 1973, Wright and Heinselman 1973, Wright 1974, Arno 1976, USDA Forest Service 1976, Davis et al. 1978, Pfister et al. 1977)

E. Wildlife and Fish

Wildlife individuals and populations are closely related to their environment and exist in the ecosystem because of factors not in spite of them. The most significant effect of allowing fire to resume a more natural role will be the creation and maintenance of vegetation mosaics and habitat opportunities for many wildlife species.

Grizzly bears are an endangered species primarily because of lack of habitat. Suitable habitat occurs throughout the District, but areas in the southern portion in the Cabinet Mountains are critical habitat. A more natural fire regime will benefit grizzlies by stimulating forage and providing habitat for prey species. In addition, more diverse plant communities will favor the grizzly's survival by creating a variety of range and habitat features. Implementation of the Troy Fire Plan will not adversely impact threatened or endangered wildlife which includes the grizzly bear and the bald eagle.

Gray-crowned rosy finches, tanagers, pine grosbeaks, and other seed-eating birds which feed heavily on mature subalpine fir probably will benefit locally by fire exclusion. The return of fire may reduce seed-eater populations where the subalpine fir overstory is killed. However, the prescriptions under which fires will be allowed to burn preclude extensive overstory kill.

Critical nesting and mating periods for birds are not in July or August when most fires would occur. Usually only observation fire management areas would have fires in the late summers, so the fire plan would have little impact on nesting and mating birds.

Fire does have the potential to disturb an animal by altering an area or feature used for a specific purpose. The effect may be short-lived or long-lived depending on the nature of the fire and the habitat use. As a result, an animal may have to migrate to a more suitable area. Fires burning in prescription would seldom burn fast enough to trap medium to large sized mammals or destroy

their habitat. The greatest impact would be on the composition and distribution of small to medium sized mammals, such as rodents, squirrels, and hares, because they have smaller territories. No lasting harmful effects are expected on nongame animals and birds because the shrubs and grasses which are used for food and cover will return rapidly.

In the long term, the influence of fire (management, prescribed, and wildfire) will generally be favorable to wildlife as a whole because a greater variety of vegetation types and features provide more habitat requirements, many of which are fire-created (snags, edges, shrubfields). Vegetation mosaics provide more requirements for animals over time. Diverse wildlife and plant communities enhance the stability of the ecosystem.

A successful total suppression policy would ultimately lead to homogeneous climax communities (logged sites excluded). Wildlife populations needing diverse and seral vegetation habitats would decrease and probably not survive.

It is expected that fish will be little affected by the revised policy. The low to moderate intensity fires which fit the burning prescriptions will not significantly alter water quality. The impact is further reduced by the fact that not all of the areas have perennial streams with fish populations. Downstream waters supporting fish do not have habitat conditions that would be adversely affected by the scale of fire anticipated.

(Leopold 1933, Dobzhansky 1941, Dasmann 1964, Odum 1969, Loucks 1970, Taylor 1973, USDA Forest Service 1976)

F. Economics

One important purpose for revising the fire management policy was that money expended to suppress all fires was not wisely spent. Low risk fires which would have achieved beneficial results were suppressed as well as intense fires which threatened life, property, and resources. By continuing the same policy, money will be spent to put out fires that could be used to meet land and resource management objectives.

The Troy Fire Plan is designed to be a cost-effective plan which uses fire to treat fuels and create fuel mosaics. The expenditures for fire suppression will decrease in the long-term because of the following reasons:

1. Suppression costs would be reduced by allowing management fires. If a fire approaches a boundary, only that portion which would cross the boundary will require suppression. However, savings would be realized when fires are allowed to cross the boundary because they are in prescription for the adjacent fire management areas.

2. Fuel mosaics will be created through the variable intensity and spread of fires. Discontinuous fuel situations will favor suppression and confinement of future management fires (if needed) and wildfires.

It is expected that costs will be incurred by the following:

1. Daily observations (by foot, vehicle, or aircraft) will be made to monitor fires.
2. A fire which was burning within the prescription may require action or suppression for a variety of reasons (air quality, burning conditions, or approaching a boundary). Suppression costs could be more than for initial attack.

(Zivnaska 1972, Davis 1974, USDA Forest Service 1976)

G. Public

Allowing management fires will appeal to members of the public who support fire in the environment because of their understanding of biotic communities and the historical role of fire. The attitude of other individuals will depend on the way fire directly affects them (smoke production, limited use of recreational areas, etc.). In addition, their impression will be formed by the way fire alters what they use in a forest and their understanding of fire-dependent ecosystems.

Fire has the potential to endanger human life and property. A management fire will create minimal danger because of the low to moderate fire intensities and daily monitoring. The behavior of fires, closure of trails and campsites, and other relevant information will be available for public information when a fire is burning. The social acceptance of this plan will largely depend on the Involve and Inform Program to actively inform, involve, and educate the public about the revised fire management policy and the Troy Fire Plan. It is important to explain the purpose of management fires and that the plan does not mean a weak fire protection force.

Conversely, keeping the total suppression policy would satisfy people who do not like the idea of fire in the forests. Much of this belief has been formed by the aggressive national fire prevention program. People who are in favor of returning fire to the environment will be adversely affected by continued suppression

(Stankey 1976, USDA Forest Service 1976)

H. Esthetics

Esthetics is difficult to evaluate objectively since it is subjected to personal interpretation. To some people the blackened and charred appearance of recently burned areas is likely to be visually displeasing. To others it might prove interesting. The blackened landscape is often subdued by post-fire vegetation during the first growing season. The sharp contrast between blackened features and a green carpet of undergrowth is pleasing to many. Fire-created snags and vegetation mosaics enhance the variety of animal life. In the long-term, the diversity of vegetation and wildlife communities resulting from a burn is an esthetic value to forest users.

Smoke concentrations may impair viewing. However, this will be for short periods until winds disperse accumulations in valley bottoms. Smoke management considerations will prevent undue heavy concentrations resulting from management fires.

The mosaic of different conifer species and age classes which cover the mountain slopes and lowlands is the artwork of past fires. This esthetic blend of colors and textures eventually diminishes in the absence of fire. By allowing fires to burn, scenic variety will be maintained.

The impact of fire suppression activities will be reduced with the fire plan. The amount of fireline and heliport construction and coloring of the landscape by chemical retardants will be lessened.

(Mutch 1974, USDA Forest Service 1976, McClelland 1977)

VI. EVALUATION OF ALTERNATIVES AND PREFERRED ALTERNATIVE IDENTIFIED

Alternative A was selected because it is a comprehensive fire management plan that recognizes fire as a natural factor yet continues protection for state and private lands and National Forest lands. In addition, this alternative will be cost effective, especially in the long run.

Alternative B was not selected because it is the old fire management policy. Consequently, it is not current with present land management goals and objectives or with the change of policy regarding fire management.

VII. MANAGEMENT REQUIREMENTS, CONSTRAINTS, AND MITIGATION MEASURES

The revised fire management policy (FSM 5103) provides the guiding principles. More specific guidance is provided by the Troy Fire Plan and land use plans.

VIII. CONSULTATION WITH OTHERS

Individuals, organizations, and agencies affected by the policy revision have been or are being informed of the Troy Fire Plan through personal communication, the newspaper, and the radio. A brochure which discusses the revised fire policy, the role of fire, and the Troy Fire Plan has been prepared for public distribution.

Members of the Troy Ranger District, Kootenai National Forest, Region One Fire and Aviation Management, and Northern Forest Fire Laboratory were consulted while developing the EAR and the Troy Fire Plan. A list of reviewers is given in the plan.

IX. FINDING OF NO SIGNIFICANT EFFECT

The impacts involved with the Troy Fire Management Plan are not significant and do not warrant an Environmental Statement.

X. LITERATURE CITED

Ahlgren, I. F., and C. E. Ahlgren. 1960. Ecological effects of forest fires. *Bot. Rev.* 26:483-533.

Arno, S. F. 1976. The historical role of fire on the Bitterroot National Forest. USDA For. Serv. Res. Pap. Intermt. For. & Range Exp. Stn., Missoula, Montana.

Beaufait, W. R. 1971. Fire and smoke in Montana forests. *In* Forest Land Use and the Environment, R. M. Weddle (ed.) Mont. For. and Cons. Exp. Stn., U. of Montana, Missoula.

Behan, M. 1970. The cycle of minerals in forest ecosystems. *In* The Role of Fire in the Intermountain West. Intermt. Fire Res. Coun., Missoula, Montana.

Bethalamy, N. 1974. An analysis of the hydrologic consequences of the Saddle Mountain and Sleeping Child fires in the Bitterroot National Forest, Montana. Intermt. For. & Range Exp. Stn., Moscow, Idaho.

Clayton, J. L. 1975. Chemical content of precipitation during a forest fire. Intermt. For. & Range Exp. Stn., Boise, Idaho.

Coleman, R. D. 1973. Natural emissions due to prescribed and wildfires. *In* Integrated Fire Management in Park Areas of the Western Region, Draft Environmental Statement. Dept. of Int.-NPS.

Cooper, C. F. 1961. The ecology of fire. *Scientific American* 204:150-160.

Cramer, O. P. 1974. Air quality influences. *In* Environmental Effects of Forest Residues Management in the Pacific Northwest. A State-of-Knowledge Compendium. USDA For. Serv. Gen. Tech. Rep. PNW-24. PNW For. & Range Exp. Stn., Portland, Oregon.

- Dasmann, R. F. 1964. *Wildlife Biology*. J. Wiley & Sons, Inc., New York.
- Davis, L. S. 1974. An exploration of the economics of fire management programs in the Rocky Mountains with emphasis on information needs. (Unpublished).
- Davis, N. 1972. Generalized soils information for the Snake River Basin Type IV Study. USDA For. Serv., Northern Region.
- Davis, K. M., B. D. Clayton, and W. C. Fischer. 1978. Fire ecology of Lolo National Forest habitat types. (Ms. submitted for publication).
- Dobzhansky, T. 1941. *Genetics and the Origin of Species*. (Sec. ed) Columbia Univ. Press, New York.
- Frazier, W. C. 1967. *Food Microbiology*. McGraw-Hill, New York.
- Habeck, J. R. and R. W. Mutch. 1973. Fire-dependent forests in the northern Rocky Mountains. *Jour. Quat. Res.* 3(3):408-424.
- Hall, J. A. 1972. Forest fuels, prescribed fire, and air quality. PNW For. & Range Exp. Stn., USDA For. Serv., Portland, Oregon.
- Heinselman, M. R. 1971. The natural role of fire in northern conifer forests. *In* *Fire in the Northern Environment*, USDA For. Serv., PNW For. & Range Exp. Stn., Portland, Oregon.
- Hemeon, W. C. L. 1973. A critical review of regulations for the control of particulate emissions. *J. Air. Pollut. Control Assoc.* 23(5):376-387.
- Hynes, H. B. N. 1972. *The Ecology of Running Waters*. U. of Toronto Press.
- Kramlich, W. E., A. M. Pearson, and F. W. Tauber. 1973. *Processed Meats*. Ave Publ. Co., Inc., Westport, Conn.
- Leopold, A. 1933. *Game Management*. C. Scrobner & Sons.
- Loucks, O. L. 1970. Evolution of diversity, efficiency, and community stability. *Amer. Zool.* 10:17-25.
- McClelland, R. B. 1977. Wildfire influences on aesthetic values in Glacier National Park. *Western Wildlands* 1(4):45-54.
- Mutch, R. W. 1970. Wildland fires and ecosystems--a hypothesis. *Ecology* 51(6):1046-1051.
- Mutch, R. W. 1974. "I thought forest fires were black!" *Western Wildlands* 1(3):16-21.
- Odum, E. P. 1969. The strategy of ecosystem development. *Science* 164:262-270.

- Paulson, N., W. A. Hough, J. O. Baker, Jr. 1978. The Clean Air Act--an analytical discussion. USDA For. Serv., Wash. Office.
- Pfister, R. D., B. L. Kovalchik, S. F. Arno, and R. C. Presby. 1977. Forest habitat types of Montana. USDA For. Serv. Gen. Tech. Rep. INT-34. Intermt. For. & Range Exp. Stn., Ogden, Utah.
- Ralston, C. W. and G. E. Hatchell. 1971. Effects of prescribed burning on physical properties of soil. In Proc. Prescribed Burning Symp., Asheville, N. C. USDA For. Serv., SE For. Exp. Stn.
- Rasmussen, R. A. and F. W. Went. 1965. Volatile organic material of plant origin in the atmosphere. Nat. Acad. Sci. Proc. 53:215-220.
- Robinson, E. and R. C. Robbins. 1968. Sources, abundance, and fate of gaseous atmospheric pollutants. Stanford Res. Inst. SRI Proj. PR-6755. Menlo Park, Calif.
- Stankey, G. H. 1976. Wilderness fire policy: an investigation of knowledge and belief. USDA For. Serv. Res. Pap. Intermt. For. & Range Exp. Stn., Ogden, Utah.
- Stone, E. L. 1971. Effects of prescribed burning on long-term productivity of coastal plain soils. In Proc. Prescribed Burning Symp., Asheville, N. C. USDA For. Serv., SE For. Exp. Stn.
- Taylor, D. L. 1973. Some ecological implications of forest fire control in Yellowstone National Park, Wyoming. Ecology 54(6):1394-1396.
- USDA Forest Service. 1976. Environmental Statement: fire management in the Selway-Bitterroot Wilderness---a proposed policy change. Bitterroot, Clearwater, Lolo, and Nezperce National Forests, Northern Region. R1-76-12. USDA-FS-FES (Adm).
- Wells, C. G. 1971. Effects of prescribed burning on soil chemical properties and nutrient availability. In Proc. Prescribed Burning Symp., Asheville, N. C. USDA For. Serv., SE For. Exp. Stn.
- Went, F. W. .960. Blue hazes in the atmosphere. Nature 187:641-643.
- Wright, H. E. and M. L. Heinzelman. 1973. The ecological role of fire in natural conifer forests of western and northern North America. J. Quat. Res. 3:317-328.
- Wright, H. E. 1974. Landscape development, forest fires, and wilderness management. Science 186:487-495.
- Zivnuska, J. 1972. Economic tradeoffs in fire management. In Fire in the Environment--Symposium Proceedings. USDA For. Serv., Denver, Colorado.



TROY FIRE MANAGEMENT PLAN

Troy Ranger District
Kootenai National Forest

1979

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I. INTRODUCTION

In 1935, the U.S. Forest Service developed a strict fire control policy known as the "10 a.m. Policy". It dictated that all wildfires would be immediately attacked and suppressed. When first attack failed, manpower and equipment were increased to control every fire within the first work period. The attack on succeeding days was planned and executed to obtain control before 10 o'clock the next morning. Each fire was suppressed regardless of burning conditions, fuels, or land management objectives. To adhere to the policy, large expenditures were made to minimize the acreage burned. This suppression policy was not always cost effective or responsive to land management objectives and, most importantly, did not acknowledge the natural role of fire in biotic and abiotic systems.

In February 1978, the 1935 fire control policy was revised and became a fire management policy. The Revised Fire Management Policy states that the Forest Service shall provide well planned and executed fire protection and fire use programs that are cost effective and responsive to land and resource management objectives. In addition, programs will support the 1974 Forest and Rangeland Renewable Resources Planning Act.

The Troy Fire Management Plan integrates the revised policy with the District's land and resource management objectives. Based on guidelines provided by land use plans, five categories of fire management areas have been established: protected, operational, observation, wilderness, and special fire management areas. There are 23 fire management areas on the District, each with one or more sets of prescription criteria which describe conditions when fires will be allowed to burn.

The purpose of the plan is to allow fire to burn under predetermined conditions so it may function as a natural ecological agent which is responsive to land and resource management objectives. In the past, fire has created diverse plant and animal communities and maintained fuel mosaics. The different fire regimes which influenced the landscape were studied to determine the role of fire as it related to the land management objectives for each fire management area. In compliance with these objectives, management fires will be used to enhance wildlife habitat, maintain wilderness characteristic, promote plant and animal diversity, maintain conditions for primitive recreation, and create variety in viewing.

An additional benefit of allowing certain fires to burn is to save money by not suppressing fires that are achieving desired results and are not endangering life, property, and resources. The cost effectiveness of this plan probably will not be realized immediately because of the expense of closely watching the first fires. However, after experience is gained and the plan is efficiently implemented, it is expected that savings will be realized.

The Troy Fire Plan is designed to combine the experience and judgement of the Management Fire Committee with the prescription criteria in order to ensure a flexible plan. The prescription criteria are intended as guidelines and not rigid formulas. The committee will ultimately decide the action on a fire after evaluation of the prescription, fire situation,

management objectives, and risks and benefits. The Troy Fire Plan will be reviewed each year and revised when necessary. Experience gained in implementing it will reveal details overlooked in its preparation and sections that need to be refined.

The plan will serve as the basis for all future fire management activities including fuel management (both natural and activity), preattack planning, wildfire prevention, prescribed fire, and organizational planning.

II. GENERAL DESCRIPTION

The Troy Ranger District is in the western section of the Kootenai National Forest in Region One. It encompasses 324,637 acres (131,380 ha) of National Forest land and 34,051 acres (13,791 ha) of state and private land. Approximately one-fifth of the National Forest land lies in Idaho.

Drained by the Kootenai River, the District is divided into two broad geomorphic units which lie roughly north and south of the river. The area to the north is in the Purcell Range in which the Yaak River, O'Brien Creek, and Pine Creek are the major drainages. The Cabinet Mountains Range lying to the east and west of Bull Lake Valley encompasses the southern portion of the District. Major drainages are Lake Creek, Ross Creek, Keeler Creek, Callahan Creek, Ruby Creek, and Star Creek which ultimately flow into the Kootenai. A number of lakes are found throughout the District.

Bedrock consists of Precambrian argillites, quartzites, siltites, and limestone deposited by shallow seas as conformable sediments 1.5 billion to 600 million years ago. Uplifting, folding, and faulting have created distinctive north and northwest faults; the most prominent are Leonia, O'Brien, Savage Lake, and Bull Lake. The Bull Lake Valley was formed when the valley fault block dropped and the Cabinet Mountains were uplifted. Subsequent glacial activity over a million years ago has further influenced the soil formation and composition. Continental ice pushed its way into the area from the north and northwest and covered much of the land mass. In some areas it was estimated to be one mile (1.6 km) thick. Alpine glaciers scoured the high mountains creating sharp land features.

Soils reflect their origin. Material formed from Precambrian sedimentary rock is less coarse than soil derived from igneous rock intrusions. Soil associated with continental glaciation contains 35-45 percent poorly-graded, rounded rock but the small particles are fine sand size. Stratified deposits of silt, sand, and/or gravel found at lower elevations were deposited by melt waters of the retreating glacier. Angular rocks and coarse fines are the product of alpine glaciation. Throughout the District, soils are generally described as residual or glacial till overlain by loess deposits. They are typically sand/silt loam with gravel and cobble size rock content. The soil hazard rating, i.e., mass failure, erosion, sediment yield, and vegetative recovery, varies according to site-specific conditions.

The present topography shows the influence of the major forces of land formation. Continental ice subdued the land by scouring the ridges and filling the valleys. Alpine glaciers sharpened features at high elevations. Faults created steep slopes and low drainage divides. A wide range of elevation occurs in the District from 1822 feet (555 m) where the Kootenai River enters Idaho to 7568 feet (2307 m) at Sugarloaf Mountain in the Cabinet Mountains Wilderness.

Forest communities form an almost continuous cover over the mountainous topography of the District. The land has been manipulated for logging, agriculture, settlement, and related purposes, but the forest remains the most significant biological feature. A wide array of plants common to the northern Rocky Mountains occur throughout the District. Climax communi-

ties are rare, constituting only a small portion of the forest cover. Examples are the western redcedar, western hemlock, and subalpine fir communities, which have escaped major disturbance for centuries. Most forested lands are in post-fire seral successional stages dominated by mixtures of ponderosa pine, Douglas-fir, western larch, western white pine, lodgepole pine, and spruce.

The variety of landform and vegetative communities affords suitable habitat for numerous fish and wildlife species. All northern Rocky Mountain big game species are found on the District. Other wildlife includes small game, waterfowl, furbearers, and nongame animals. Habitat exists for the grizzly and bald eagle.

People fish, hunt, hike, pick berries, camp, picnic, sightsee, snowmobile, and ski throughout the District. Some areas receive greater pressure than others, especially easily accessible areas.

The Troy District has climatic features typical of temperate mountainous terrain. (Long-termed weather records are presented in appendix B.) Summers are short and winters are long. Diurnal temperatures can fluctuate widely, particularly during periods of clear skies. In July and August, maximum temperatures may reach above 90° F (32° C) during the day while the night cools to about 45° F (7° C). Daily winter temperatures are more consistent with an average range of 20° to 40° F (-7° to 4° C). About 30 days a year the temperature remains below 32° F (0° C). Overall, temperatures are moderate because of the moisture in the air.

It is difficult to characterize the climate because of the mixed influence of the "Pacific Maritime" from the west coast the "Continental" inflow from Canada during the winter. The climate is best described as "Modified Pacific Maritime" implying less severe winters than in the true "Continental" area and a different precipitation pattern from the "Continental" area where summer is the wet season.

Average annual precipitation is 23 inches (58 cm) at the Troy weather station. (The range of precipitation is discussed later for each fire management area.) Approximately 40 percent occurs as rainfall from April to September. July and August are typically the driest months, and late fall and early winter months are the wettest (November-January). Rains and snows are often steady and soaking accompanied by periods of cloudy skies. Hail and severe thunderstorms are very rare.

Lightning storms reach a peak in June, July, and August but only occur three or four days per month on the average (Finklin 1978). Nearly half the storms begin between 1500 and 2100 M.S.T. Evening storms (between 1800 and 2400 M.S.T. appear to have the greatest cloud-to-ground lightning activity.

III. FIRE ECOLOGY

Fire is a natural agent which brings change to forests. Just like landslides, floods, winds, drought, insects, and diseases, it is an important force that shapes the landscape.

In the northern Rocky Mountains, fire is the primary agent of disturbance which has been in effect for thousands of years, and evidence of past fires can be observed throughout the Troy District. The most ubiquitous but little noticed feature is charcoal in the soil and bogs. It is the most conclusive evidence of the long history of fire throughout the area. Fire scars and char on trees illustrate the repeated occurrence of fire over the years, and scars provide accurate records to determine fire history. A patchwork pattern of shrubfields, meadows, young forests, and old forests cover the land. Snags can be seen towering above shrubfields and even-aged conifer regeneration or found interspersed in stands of mature trees. Fire edges mark the boundaries of different age classes, species composition, and plant communities.

In 1910, stand-destroying fires burned a large portion of the District, primarily Bull Lake Valley, the Cabinet Mountains east of the valley, and parts of the Callahan Creek and Yaak River drainages. In addition, much of the Ross Creek, Callahan Creek, Keeler Creek, and Star Creek drainages were intensively burned in the mid- to late 1800's. Severe fires throughout the District have maintained seral stands and interrupted succession of climax communities which would be dominated by Douglas-fir, spruce, grand fir, western redcedar, western hemlock, and subalpine fir. Consequently, seral species prevail especially lodgepole pine, Douglas-fir, western larch, ponderosa pine, and western white pine.

The influence of extensive crown fires is most noticeable and certainly receives the most attention. However, low to moderate intensity fires were quite common especially on dry aspects. Examination of fire scarred trees growing on the south facing slopes of the bighorn sheep range, Spring Creek, Ross Creek, Pine Creek, and O'Brien Creek, to name a few sites, has revealed from one to thirteen scars on mature ponderosa pine and Douglas-fir.

Fires of varying severity have burned and reburned these forests. The frequency of recurrent fires depends on the climate, topography, existing vegetation, fuels, and other factors. As a result of the flammability and availability of fuels, fire occurrence is variable. Stream bottom and subalpine communities represent near-climax to climax situations where fire is an infrequent visitor. The protection of these areas is attributed to the cool, moist environment which is responsible for the reduced fire frequency and lower fire intensities. Dry sites have more burnable material so have a higher frequency. The rate of reoccurring fire on much of the forested land is between these two extremes.

Protected stream bottoms often have cedar-hemlock communities. The prime example is the Ross Creek Cedar Grove which is estimated to be over 600 years old and has not experienced a severe fire in that time. About 1890, a stand-destroying fire swept through the drainage, killing most of the trees on the mountainsides. Along the creek the fire intensity was great enough to reduce the size of the original cedar community to the present grove. The crown fire intensity decreased in the cool, streamside environment until it became a surface fire which died out on the forest floor.

Wet sites have heavy fuel loads in the form of deep duff layers and down, rotting log material. They do not burn frequently, rarely more often than once in a few centuries. However, when conditions are favorable to fire, the heavy fuels insure a very intense fire. This can be observed further upstream from the grove where the crown fire killed the overstory and opened the forest for seral conifers.

Subalpine areas are protected in the sense that the fire season is very short, occurring in the late summer. In addition fuels are light and scattered. Stands of subalpine fir, alpine larch, whitebark pine, and spruce are open-grown with little regeneration growing beneath the canopy. Shrub and herb communities, which form much of the ground cover, are not readily available fuel because of the moisture content of the live plant material. Rock landform separates plant communities and fuel, and in many cases, it creates a natural barrier for fire spread. Consequently, fire intensity is low, and when a fire starts the spread is limited by lack of available fuels. Small-area fires rarely have more impact than temporarily reducing the undergrowth and killing a few trees. On an average, six small-area lightning fires occur during the fire season.

Large-area fires are unusual in the subalpine regions. When they do occur, they generally enter as severe crown fires which were burning in the continuous forests at lower elevations. The damage to the vegetation may be severe and extensive. Because of the cold, wet climate revegetation may take several decades. Fires of this magnitude occur at intervals of 200 years or more (over a given site).

The driest areas on the District are the south facing slopes, especially at lower elevations. Historically, fires are most frequent here and generally have less impact when they occur on a regular basis because they keep fuel loadings down and prevent the development of ladder fuels in the understory. In the past, these areas were fire maintained shrubfields or open-grown stands of ponderosa and Douglas-fir. Fire scar evidence shows that fire was a regular feature which appeared three or four times a century on the average. These south-facing slopes are important spring and winter ranges for big game animals because periodic fires improved the availability and value of food species in the undergrowth. The effect of fire suppression has had the most impact on these sites because the natural, relatively short-interval fire frequency has been disrupted.

Most of the forests on the District fall between the cold, moist and the hot, dry environments, so the fire regime is different than previously discussed. Infrequent severe fires in the past kept these forests in a seral status. If the forests had not been periodically disturbed the climax subalpine fir and spruce trees would dominate now instead of the seral conifers; larch, Douglas-fir, white pine, and lodgepole.

It is not unusual to find one to three fire scars on larch, lodgepole, and Douglas-fir. This relates that moderate surface fires were a common feature which maintained the seral component and reduced ground fuels and ladder fuels. In dry years fire severity increased, and the result was an intense fire which killed most trees. Stand-destroying fires would occur at 200- to 300-year intervals on a given site. Of course, the amount of forest burned at one time varied with the conditions, but it is not unusual to see an extensive tract of land covered by fire initiated regeneration. The noted fires of 1910 are examples of of severe fires burning several square miles.

Fire is an innate feature of the vegetation on the District. Most of the communities are created and maintained by fires which occur with varying frequency and severity. Plants have adjusted to periodic fires by developing features such as thick bark, high branches, large seed supplies, rootstock regeneration, and serotinous cones. Tree species that are well adapted grow best on a burned area soon after a fire. Lodgepole, larch, ponderosa, and Douglas-fir benefit from the increased nutrients, soil free from litter, ample sunshine, and reduced competition from other plants. In contrast, spruce, grand fir, subalpine fir, cedar, and hemlock, which prefer partial shade and plenty of moisture, can grow successfully under the canopy of trees which follow the fire.

Nearly all shrubs and herbaceous plants are adapted to fire in two ways. First, root systems which escape damage provide an important survival adaptation. Most of the undergrowth species found on the District are capable of regenerating as suckers from the root crowns. Second, large seed supplies, seeds that are heat tolerant, and seeds that have a storage-life in duff and caches are other means of adaptation. Because vegetative reproduction gives them an advantage over conifers, the undergrowth plants usually become established first on burned sites.

A discussion of fire ecology would not be complete without mentioning the wildlife. Animals are directly affected by the heat and smoke of fire as well as indirectly influenced by the resulting vegetative changes. The wildlife of the northern Rocky Mountains, like the plants, has evolved with fire. A burn that destroys the habitat of one animal creates a home for another. Fire is an important agent of a diverse ecosystem, and diversity provides food, cover, and homes for more wildlife.

The relationship between fire and the major habitats types (h.t.) which occur on the District have been discussed in detailed in a separate report (Davis et al. Ms. in prep.). Although the paper deals with

these habitat types on the Lolo National Forest, the information can be applied to the situation on the Troy District. The habitat types are arranged into Fire Groups based on the response of the tree species to fire and the roles these take during successional stages. The exception is one group which is a collection of miscellaneous vegetation types. Appendix C presents the major habitat types on the District, descriptions of the relevant Fire Groups, and diagrams that give a visual summary of the role of fire in each group. This information should be used in conjunction with "Forest habitat types of Montana" (Pfister et al. 1977). Differences in fire behavior and in successional patterns often depend on very small changes in fuel, temperature, sunlight, moisture, topography, and seed availability. Consequently, the land manager should evaluate the local conditions of a particular site and use the diagrams as a general guide for forest succession.

IV. FIRE MANAGEMENT AREAS

A fire management area is a parcel of land which has common fire management objectives as indicated by land management plans and interdisciplinary resource management. In the Troy Fire Plan, there are five categories of fire management areas which were based on management objectives developed in the Kootenai land use planning process. These categories are described below, and the fire management areas in each are listed. The District was divided into 23 areas (figure 1), and they are described in table 1. A large scale map of the fire management areas is inside the back cover.

- A. Protected area - All state and private lands for which there will continue to be an immediate suppression policy because of life, property, and resources. Unplanned fires will be attacked immediately in order to gain control as soon as possible. Fire can be used only for designated purposes by landowners with air quality and/or burning permits. The entire protected area is considered one fire management area. The total area is 34,051 acres (13,791 ha).
- B. Operational Areas - Forested lands which land use plans state management activities will be carried out on specified resources, primarily timber and big game. Operational areas are essentially the productive timber land. In the past, prescribed fire has been used to treat slash and improve game range. A new approach will be taken with unplanned ignitions, whether man-caused or lightning-caused. Fires occurring on identified big game spring and winter range will be allowed to burn when they are achieving desired results described in the objectives for management fires in these areas. Elsewhere in operational areas, fires will be suppressed. However, when low to moderate fire danger prevails (Manning Class 3-minus day or less), modified initial attack may be used for purposes of crew safety and cost-efficient suppression.

Fire management areas within this category are:

Madge Creek
Spar Lake
Keeler Creek
Callahan Creek
Star Creek
Pine Creek
O'Brien Creek

Total area: 242,358 acres (98,154 ha)

- C. Observation areas - Lands managed for primitive recreation, wildlife habitat, viewing, and natural vegetation diversity according to land use plans. These areas have been withdrawn from timber entry. Essentially they are high elevation areas where vegetative communities are interspersed with rock land-form. Fire danger is typically low because of sparse, scattered fuels and natural barriers to fire spread. Unplanned fires caused by people or lightning will be allowed to burn when they are achieving desired results described in the objectives for management fires in these areas. Unwanted fires will be suppressed.

Figure 1. Troy Ranger District fire management areas.

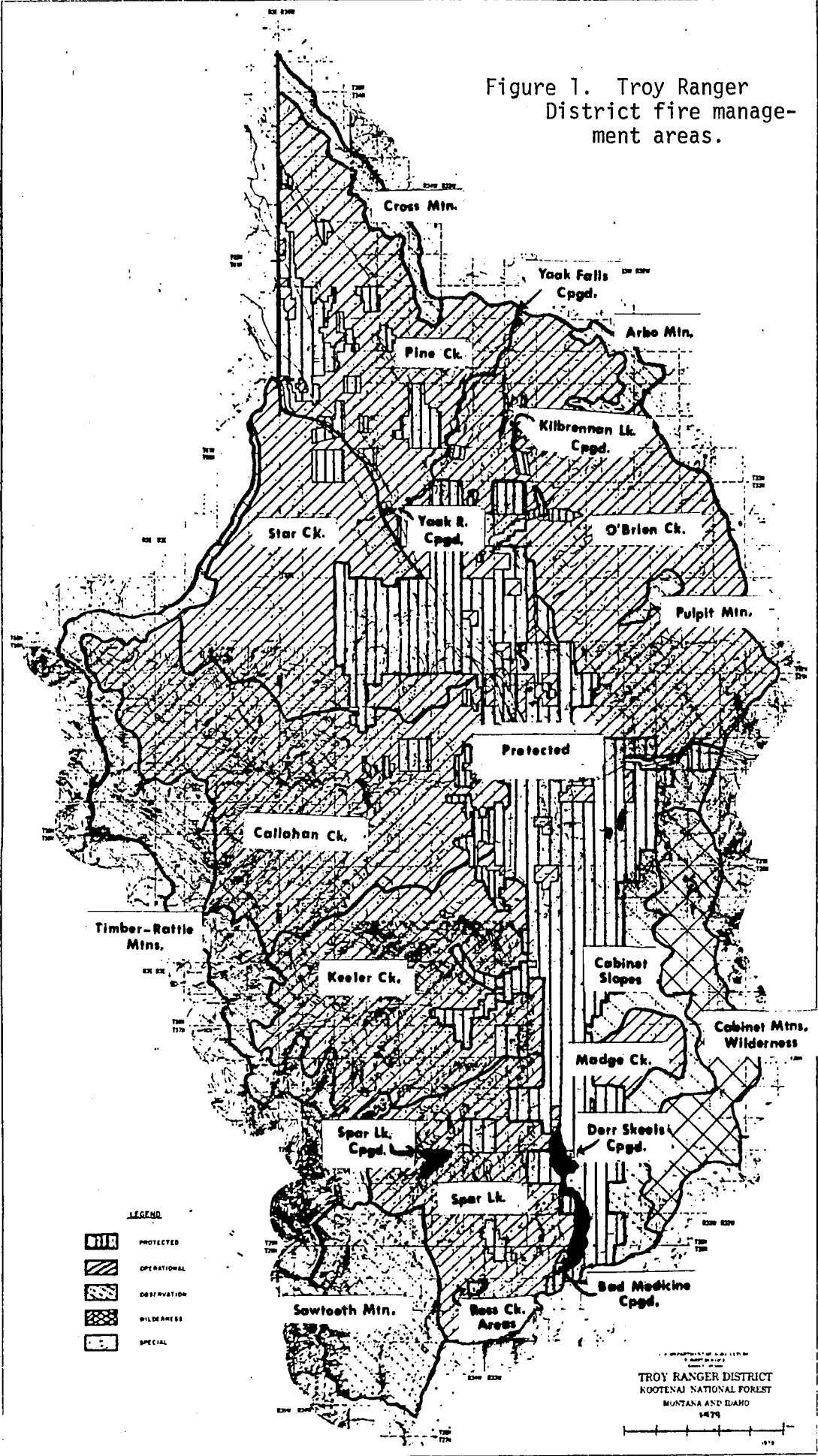


Table 1

Description of the fire management areas on the District.

<u>Area</u>	<u>Acres</u>	<u>Elevation</u>	<u>Predominant Habitat Types</u>	<u>Adjacent Lands*</u>	<u>Reported Fire Occurrence</u>	<u>Fire Prescription</u>
Protected fire management area:						
Primarily in central valleys and low lands	34,051	1800'-5470'	TSHE/CLUN PSME/PHMA PSME/ARUV ABGR/CLUN	Idaho Pan-handle NF Libby RD Cabinet RD	7 fires/yr.	Burning permit and/or air quality permit. Fire danger moderate or below.
Operational fire management areas:						
Madge Creek	4,147	2500'-6200'	TSHE/CLUN PSME/PHMA	State/Private	1 fire/10 yr.	≤30 ERC and ≤38 BI with suitable conditions (Big game range only)
Spar Lake	29,497	2200'-6600'	TSHE/CLUN THPL/CLUN THPL/OPHO	Idaho Pan-handle NF Cabinet RD State/Private	1 fire/yr.	≤30 ERC and ≤38 BI with suitable conditions (Big game range only)
Keeler Creek	38,943	2200'-6437'	TSHE/CLUN PSME/PHMA ABLA/LUHI ABLA/MEFE	State/Private	1 fire/yr.	≤30 ERC and ≤38 BI with suitable conditions (Big game range only).

*Other than Troy Ranger District lands

<u>Area</u>	<u>Acres</u>	<u>Elevation</u>	<u>Predominant Habitat Types</u>	<u>Adjacent Lands*</u>	<u>Reported Fire Occurrence</u>	<u>Fire Prescription</u>
Callahan Creek	52,164	2000'-6675'	TSHE/CLUN PSME/PHMA PSME/XETE	State/Private	3 fires/2 yr.	≤30 ERC and ≤38 BI with suitable condi- tions. (Big game range only).
Star Creek	35,712	1800'-6675'	TSHE/CLUN PSME/PHMA PSME/CARU ABLA/CLUN	Idaho Pan- handle NF State/Private	2 fires/yr.	≤30 ERC and ≤38 BI with suitable condi- tions. (Big game range only).
Pine Creek	21,518	1800'-5600'	PSME/PHMA TSHE/CLUN ABGR/CLUN	Yaak RD Idaho Pan- handle NF State/Private	3 fires/2 yrs.	≤30 ERC and ≤38 BI with suitable condi- tions. (Big game range only).
O'Brien Creek	60,377	1800'-6770'	TSHE/CLUN ABGR/CLUN THPL/CLUN PSME/PHMA	Libby RD State/Private	5 fires/2 yrs.	≤30 ERC and ≤38 BI with suitable condi- tions. (Big game range only).
Observation fire management areas:						
Cabinet Slopes	15,281	2500'-7395'	TSHE/CLUN PSME/PHMA ABLA/XETE ABLA/MEFE	State/Private	1 fire/2 yr.	Preseason Post-season low

<u>Area</u>	<u>Acres</u>	<u>Elevation</u>	<u>Predominant Habitat Types</u>	<u>Adjacent Lands*</u>	<u>Reported Fire Occurrence</u>	<u>Fire Prescription</u>
Sawtooth Mountain	17,656	3000-6906	ABLA/LUHI TSHE/CLUN ABLA/CLUN ABLA/XETE	Cabinet RD Idaho Pan- handle NF	1 fire/4 yr.	Preseason Regular season Post-season high
Timber- Rattle Mountains	25,824	3200-6785	ABLA/CLUN ABLA/XETE ABLA/MEFE ABLA/LUHI Rock	Idaho Pan- handle NF	1 fire/ yr.	Preseason Regular season Post-season high
Pulpit Mountain	1,477	4800-6556	ABLA/XETE ABLA/CLUN ABLA/MEFE ABLA/LUHI	-0-	1 fire/20 yr.	Preseason Post-season low
Arbo Mountain	2,411	4200-6350	PSME/AGSP ABGR/CLUN ABLA/MEFE	Yaak RD	1 fire/40 yr.	Preseason Post-season low
Cross Mountain	3,968	4600-6689	ABLA/XETE	Yaak RD Idaho Pan- handle NF	1 fire/4 yr.	Preseason Regular season Post-season high
Wilderness fire management area:						
Cabinet Mountains Wilderness	15,365	2500-7568	Rock PSME Scree ABLA/LUHI ABLA/MEFE ABLA/XETE	Libby Rd Cabinet RD	1 fire/3 yrs.	<53 ERC with suitable con- ditions.

<u>Area</u>	<u>Acres</u>	<u>Elevation</u>	<u>Predominant Habitat Types</u>	<u>Adjacent Lands*</u>	<u>Reported Fire Occurrence</u>	<u>Fire Prescription</u>
Special fire management areas:						
Ross Creek Scenic Area	100	2850'	THPL/CLUN	-0-	0 fires/39 yr.	Before 6/1, after 9/30 & suitable conditions.
Ross Creek Picnic Area	20	2850'	THPL/CLUN	-0-	0 fires/39 yr.	Before 6/1, after 9/30 & suitable conditions.
Bad Medicine Campground	38	2350'	TSHE/CLUN	State/Private	1 fire/20 yr.	Before 6/1, after 9/30 & suitable conditions.
Dorr Skeels Campground	46	2300'	THPL/OPHO	State/Private	0 fires/39 yr.	Before 6/1, after 9/30 & suitable conditions.
Spar Lake Campground	20	4400'	TSHE/CLUN	-0-	0 fires/39 yr.	Before 6/1, after 9/30 & suitable conditions.
Kilbrennan Lake Campground	23	2680'	TSHE/CLUN	-0-	0 fires/39 yr.	Before 6/1, after 9/30 & suitable conditions.
Yaak River Campground	30	1800'	TSHE/CLUN	-0-	1 fire/8 yr.	Before 6/1, after 9/30 & suitable conditions.*
Yaak Falls Campground	20	2400'	PSME/PHMA	-0-	0 fires/39 yr.	Before 6/1, after 9/30 & suitable conditions.

Fire management areas within this category are:

Cabinet Slopes	
Sawtooth Mountain	
Timber-Rattle Mountains	Total area: 66,617 acres
Pulpit Mountain	(26,980 ha)
Arbo Mountain	
Cross Mountain	

- D. Wilderness area - Designated wilderness area where fire will be permitted to assume a more natural role. Land management plans for the wilderness support the development of a functional fire management plan to return fire to the ecosystem. Lightning fires will be allowed to burn when they achieve desired results. Man-caused and unwanted fires will be suppressed.

The fire management area in this category is:

Cabinet Mountains Wilderness	15,365 acres (6,223 ha)
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- E. Special areas- Forested lands which are managed for recreational and educational purposes, according to land use plans. Fire has been used for hazard reduction of debris. Unplanned fires will be allowed to burn when they achieve desired results described in the objectives for management fires in these areas. Either man-caused or lightning-caused ignitions are permitted. Unwanted fires will be suppressed.

Fire management areas in this category are:

Ross Creek Scenic Area	
Ross Creek Picnic Area	
Bad Medicine Campground	
Dorr Skeels Campground	Total area: 297 acres
Spar Lake Campground	(120 ha)
Kilbrennan Lake Campground	
Yaak River Campground	
Yaak Falls Campground	

V. MANAGEMENT FIRE COMMITTEE

The Management Fire Committee is composed of the Fire Management Officer (FMO), Silviculturist, and a resource representative. When the FMO and Silviculturist are away, the designated actings will be their replacements. The person who performs as the resource representative depends on the location of the fire. For example, if a fire is in a special area, the recreation specialist will be called. If it occurs on a game range, the wildlife specialist will be included. Resource representatives will be selected before the fire season. The FMO will be chairman of the committee.

The Management Fire Committee has several duties. They are as follows:

1. To make the decision whether a fire fits the prescription criteria to become a management fire based on the report of the evaluator and any other information needed to make the determination.
2. To get approval from the S.O. Fire Staff when it is necessary to make a deviation from the prescription criteria in order to classify a fire as a management fire.
3. To review the management fire daily using the prescription criteria and any other relevant information.
4. To be responsible for the decision of classifying a man-caused ignition as a management fire.
5. To ensure that the daily decisions regarding a management fire have been documented.
6. To develop an escaped fire situation analysis (appendix D) for management fires which burn out of prescription and escape.
7. To determine the amount of area management fires should burn when there are specific considerations, such as special areas, identified big game winter and spring ranges, watershed, soil, and air quality.
8. To order suppression on management fires whenever needed.

The prescription criteria for each of the five categories of fire management areas are shown in decision flow charts. When a potential management fire starts, the committee will use the appropriate flow chart to determine whether the fire fits the criteria. The flow charts will be reviewed at least daily to ensure a management fire keeps its status. The members of the committee have authority to order suppression or allow a fire to burn based on direction from the fire management plan and assessment of the fire situation, the land management objectives, and the risks and benefits involved (intolerable losses).

The purpose of having a Management Fire Committee and prescription criteria is to have a flexible fire plan. The criteria presented in the decision flow charts are to be used as standard guidelines rather than rigid formulas. The variation in land management objectives, vegetative communities, and fuel situations warrant a certain reliance on the judgement of the committee members who evaluate the situation and determine the course of action.

When a fire starts, it can either be suppressed or evaluated for management fire status (see figure 2). If suppression is required, forces will be dispatched without involvement of the Management Fire Committee. This situation would exist when a fire starts in the protected fire management area or in another fire management area when the condition are well beyond the prescribed criteria. However, if it is a potential management fire, an evaluator will be sent. Most often this will be the Assistant Fire Management Officer (AFMO). At the same time, forces will be dispatched so no time is lost if the decision is for suppression. The size of the forces is predetermined by the predispatch system and the Manning Class level that has been prepared for each fire management area.

After assessing the fire, the evaluator will contact the FMO by radio and give his evaluation and recommendation. (The duties of the evaluator are discussed in Section XIII, Part C.) The FMO, who has already assembled the committee, relays the evaluator's report. The committee makes the decision based on the report, the prescription criteria, and any other relevant information. If the committee deviates from the criteria in order to classify a management fire, it must get approval from the S.O. Fire Staff.

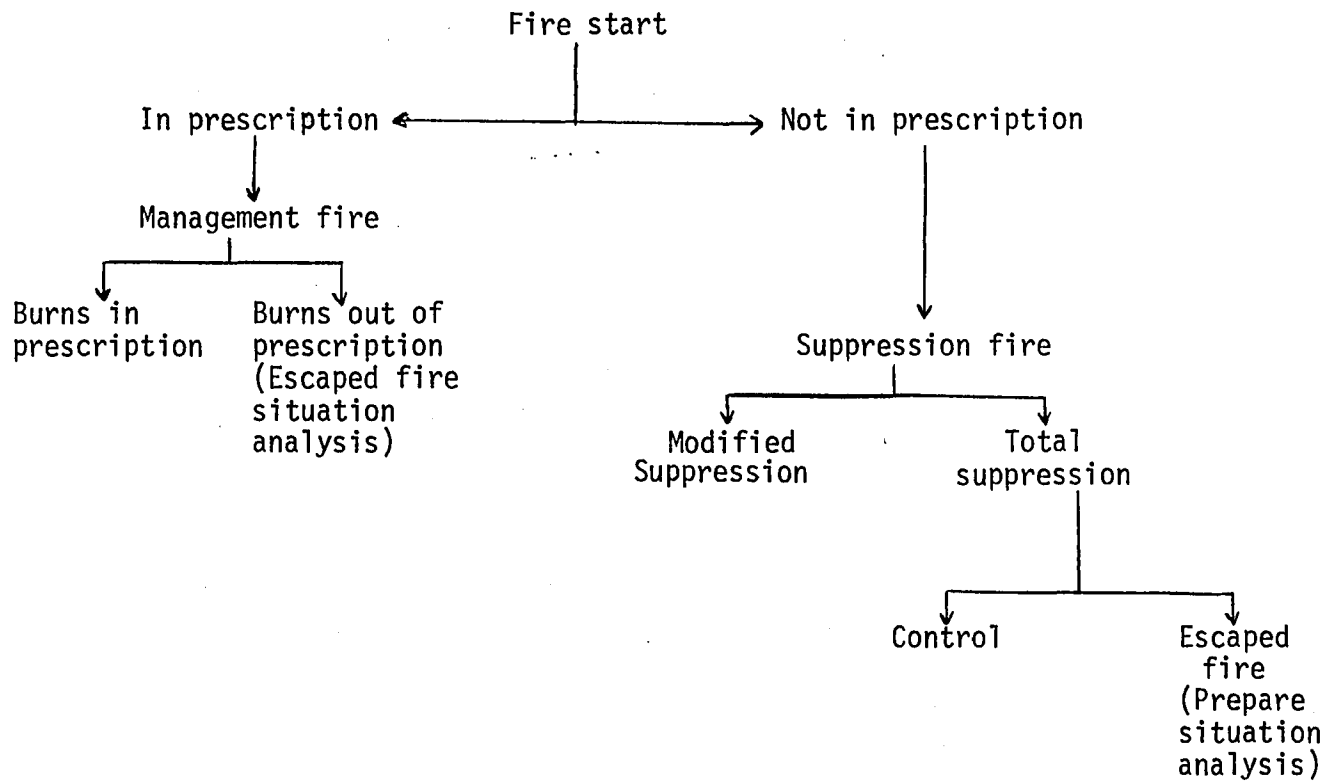
If the decision is to suppress, the FMO contacts the AFMO and orders the fire to be put out. When the fire is classified as a management fire, the FMO makes a report to the District Ranger (or acting) and states the reasoning. The Ranger has authority to approve or disapprove the committee's decision. When approval is given by the Ranger, the FMO tells the AFMO. Then he contacts the S.O. Fire Staff to report the status of the management fire. At this time, new or updated information supplied by the S.O. Fire Staff will be coordinated with the decision.

The Management Fire Committee is a small, effective group, and the decision making process involving the AFMO, committee members, and District Ranger is designed to be time efficient. Most decisions can be made in minutes when fires occur well within the prescription criteria. However, complex situations will require a longer period of time.

To facilitate the decision making process, a daily status board will be located in the dispatch office. It will have the decision flow charts showing the prescription criteria for fire management areas where fires are allowed to burn. For example, before June 1 only those areas with preseason prescriptions will be on the board. In addition, there will be the energy release components and burning indices for Fuel Models C, G, H, I, and J for the current day, the five previous days, and the one day forecast. Other information includes the Manning Class Level for the District, Forest, and Region, current and projected weather, smoke management conditions, and equipment and manpower status on the District, Forest, and Region. Finally, it will have the status of all fires burning on the District. By having this information readily available, decisions can be made quickly. In some situations, decisions can be made that any unplanned ignitions will be suppressed in certain areas because of the conditions shown on the board.

Figure 2

Decision flow chart to determine action on a fire start



VI. PRESCRIPTION CRITERIA FOR MANAGEMENT FIRES

A management fire is a fire which is burning in a specified area under predetermined conditions and which is achieving identified management objectives. Each category of fire management area has prescription criteria written specifically for the time of year, land uses, vegetation types, and fuel situations encountered. The criteria are displayed in decision flow charts for the fire management areas.

Several criteria must be met before a fire is in prescription. They are discussed below:

A. Fire Season

In the observation areas the fire season will remain in the traditional pre-season, regular season, and post-season periods identified by calendar dates. Pre-season begins about April 1 after the snow melts and ends June 1. Post-season begins September 15 and ends with soaking rains in November. Regular season is the interim between June 1 and September 15.

In the observation fire management areas, two prescription guidelines have been written for the past season. One is for the "high" elevation zone and the other for the "low" elevation zone. The zone characteristically has more open forest cover and sparser fuels than the low elevation zone, therefore a single prescription covering both zones would not suit the range of vegetative communities and fuel situations involved.

Five thousand feet (1525 m) elevation is roughly the dividing line between the zones; however, some observation areas have been included in one prescription regardless of the range of elevation involved. For example, the Cabinet Slopes observation area which varies from 2500 feet (763 m) to 7395 feet (2255 m) will have the low elevation prescription. Continuous fuels over much of the area and oversteepened slopes pose containment problems under conditions described in the high elevation prescription.

B. Fire Weather and Fire Behavior

Current and forecasted fire weather and behavior are evaluated daily to assess possible fire confinement and control problems. Changes in weather or behavior warrant a review of the fire situation, possibly resulting in limited or total suppression. AFFIRMS computerized weather information and the three-day narrative outlook from the Missoula Fire Weather Office (National Weather Service) are sources of fire weather and behavior information for the Troy District.

"Acceptable" fire weather and behavior mean that neither weather or behavior factors are creating a dangerous fire situation. This is a subjective judgement for individual fire management areas which is made by the evaluator, monitor, and/or Management Fire Committee. For example, the effect of increased winds on a fire in a high elevation observation area would likely cause less concern than increased winds on a fire in a special area campground.

C. Energy Release Component (ERC) and Burning Index (BI)

The FIRDAT program provided the energy release component (ERC) and burning index (BI) values from 1967 through 1977, June through October. Weather information (AFFIRMS) to calculate these values was obtained from the weather station at Troy, Montana (elevation 1950 feet (592 m)). ERC and BI will be computed on-site at a management fire by using the Texas Instrument calculator with the National Fire Danger Rating System program.

The seasonal trends of ERC and BI are very similar. In early June, both are in the 20's and 30's. They gradually climb and peak, usually in August. The ERC typically reaches its peak before the BI. Following a noticeable decline, a second peak usually occurs in September.

ERC and BI are used in the prescriptions because they are indicators of fire danger which can be used to interpret fire behavior. In the Troy Fire Plan, ERC is used alone or with BI. When used alone, ERC is high (≤ 53) in order to allow a long period during the season when fires may burn. ERC is used at this level for fire management areas which typically are high elevation areas with light, discontinuous fuels and natural barriers. Essentially, these are low risk areas. The combination of $ERC \leq 30$ and $BI \leq 38$ used in this plan defines a more restricted period when fires can burn. It is necessary in fire management areas where life, property, and resources are primary concerns.

Examples of the ERC and BI levels are given using the curves for 1967 in appendix E. The curve shows ERC was above 53 in 1967 for a six-week period in late August and all of September. Therefore, fires could burn throughout the season exclusive of this six-week period as long as they fit the prescription criteria and were approved by the Management Fire Committee. The Management Fire Committee has authority, with S.O. approval, to allow fires to burn when $ERC \geq 53$. In this situation, the committee evaluates each fire and determines that the benefits override the cost or need of suppression.

Compare the curves for ERC and BI for 1967 in appendix E. By mid-June ERC was above 30 and BI above 38, and they stayed above until mid-October. In fire management areas with the combination ERC and BI, fires in 1967 would have been suppressed from mid-June to mid-October. It is important to note again that the Management Fire Committee has the latitude, with S.O. approval, to evaluate each fire before ordering suppression action. For instance, a fire is burning in prescription in the Cabinet Mountain Wilderness, where the prescription criteria is $ERC \leq 53$ with no BI restrictions. The committee may decide to suppress only that portion of the fire burning towards the Cabinet Slopes area. Or it may decide total suppression is necessary even for the fire in the wilderness.

The number of days $ERC \leq 30$ and $BI \leq 38$ can change considerably for each fire season. Examination of both curves from 1967 through 1977 in appendix E shows this variation.

The ERC and BI limits were established using Fuel Model G. However, these limits can be readily used with Models C and H.

The ERC and BI are discussed because of their importance in assessing fire danger. More detailed description of these values from 1967 through

1977 is given in appendix E. Discussion of the general trends based on the 11-year averages are included. The summaries of the ERC and BI for Fuel Models G and I follow in appendix F.

1. Energy Release Component. The ERC is a number related to the available energy (Btu) per unit area (square foot) within the flaming front at the head of a fire (Deeming et al. 1977). This differs from fireline intensity in that the latter is the rate of heat release per unit length caused by changes in the moisture contents of the various fuel classes, including the 1000-h TL (time lag) class. ERC is derived from predictions of (1) the rate of heat release per unit area during flaming combustion and (2) the duration of flaming.

ERC may be considered a composite fuel moisture "index", and as such it is a relatively stable evaluation tool for decisions that might need to be made 24 to 72 hours ahead of an expected fire situation (Lancaster 1973). Daily variation will be small since ERC is a composite index and wind is not considered in the calculation. ERC is an important guide to fire behavior. As ERC increases so will the difficulty of fire containment.

At Troy, the ERC is around 25 at the beginning of the record period in June. It gradually increases throughout June and July until the peak value is reached in late July or mid-August. On the average, ERC stays above 30 at least three months and above 53 for one and one-third months. However, during five years of the record period the ERC did not rise above 53. A decline followed by a second rise occurs in late August or early September. This activity represents the "Indian Summer" period in the autumn months.

2. Burning Index. The BI is a number relating the contribution of fire behavior to the effort of containing a fire (Deeming et al. 1977). The difficulty of containment is not proportional to the flame length as postulated in the 1972 NFDRS summary publication. Instead, containment difficulty is related to fireline intensity, i.e., the rate of heat release per unit length of fireline (Byram 1959).

BI is based on flame length. Byram (1959) has related flame length to fireline intensity. Therefore, flame length, fireline intensity, and BI are interrelated. Deeming et al. (1977) have summarized this relationship in table 2 and described the critical fireline intensities.

At Troy, the BI is between 25 and 45 at the beginning of the record period in June. It gradually climbs to a peak index in August or September. High values occurred for a two week period from mid-August to mid-September. The records indicated an average of 60 BI at this time. An interpolation of BI 60 gives a fireline intensity of 385 Btu/s/ft and flame length of 6.0 ft (1.8 m). In early September, the index declines then climbs again. By the end of the record period, a gradual decline is evident. This last activity is a reflection of "Indian Summer" weather.

Table 2

Fire behavior, controllability, and fireline intensity
(from Deeming et al. 1977)

Burning Index	Fireline Intensity (Btu/s/ft)	Flame Length (Ft)	Narrative
0-28	0-50	2.8	Most prescribed burns are conducted in this range.
38	100	3.8	Generally represents the limit of control for manual attack methods.
78	500	7.8	The prospects for direct control by any means are poor above this intensity.
92	700	9.2	The heat load on people within 30 feet of the fire is dangerous.
108	1000	10.8	Above this intensity, spotting, fire whirls, and crowning should be expected.

3. ERC, BI, and Large Fires. Six Class C or larger fires have occurred on the Troy District during the fire seasons of 1967 through 1977. Table 3 shows the ERC and BI values around the time of the fires and illustrates the relationship between these values and fire behavior. All of the large fires occurred when ERC and BI were high for that year. The burning conditions were characterized by an ERC around the 80 percentile level and BI beyond the limit of control for manual attack methods. An example is the Cross Mountain fire in 1967, which started on August 11 and was contained August 16. It was a Class D fire in which 270 acres (109 ha) were burned. Both the ERC and the BI values are given for three days before and after the fire to show the fire danger situation.

Table 3

ERC and BI values for Class C fires or larger occurring on the Troy Ranger District during the 11-year period, 1967 through 1977.

1967 - Cross Mountain August 11-16 Class D - 270 acres (109 ha)
O'Brien Mountain August 11-15 Class C - 60 acres (24 ha)

Aug.	8	9	10	11	12	13	14	15	16	17	18
ERC	45	48	49	50	51	51	51	52	52	51	52
BI	39	50	47	56	51	51	52	47	59	59	52

1968 - Star Creek #2 August 6-7 Class C - 50 acres (20 ha)

Aug.	3	4	5	6	7	8	9	10
ERC	60	59	57	58	59	60	54	55
BI	59	75	56	66	70	80	44	60

1970 - Studebaker Draw October 4-6 Class D - 232 acres (94 ha)

Oct.	1	2	3	4	5	6	7	8
ERC	50	49	51	52	36	43	52	26
BI	47	53	51	116	30	41	47	17

1973 - Savage Lake August 15 Class C - 14 acres (6 ha)

Aug.	12	13	14	15	16	17	18
ERC	51	49	51	52	52	53	52
BI	43	51	62	46	61	65	48

1974 - Stanley Peak September 26 Class C - 25 acres (10 ha)

Sept.	23	24	25	26	27	28	29
ERC	33	33	33	32	33	36	35
BI	35	31	30	38	30	45	32

D. Human Life and Property

Safety for human life and property is of the utmost concern. Fire that endangers life and property will be suppressed.

E. Smoke Management

The impact of smoke on airsheds will be evaluated at the time a management fire occurs and daily while it is burning. If one or more fires create unacceptable smoke loads, it will be necessary to take partial or total suppression action.

Smoke management decisions will be made as described in the Montana State Airshed Group Operative Plan. The number of fires burning, the location and elevation, extent, and duration of smoke, public sentiment, and atmospheric conditions are some factors which would influence the decision. The daily and one-day forecasted smoke dispersal predictions will aid making smoke management decisions.

In the fall Libby, Bull Lake Valley and Kootenai River Valley around Troy are prone to inversion layers which trap smoke in the valleys. This will be a major consideration of smoke management conditions for management fires in this season. Fall, more than any other season, is the time when problems are likely to occur because of stagnant air.

Section 118 of the Clean Air Act (PL 88-206) states that each officer, agent, or employee of the Federal Government must comply with Federal, State, interstate, and local requirements concerning control and abatement of air pollution to the same extent as any other person. The Montana Air Quality Bureau monitors the weather closely, especially in the fall, to advise of building inversions. If necessary, the Bureau will limit or ban burning activities. The Airshed Coordinator for the Kootenai also has authority to limit or ban burning on the Forest.

F. Available Suppression Forces

Before allowing a management fire to burn, an assessment will be made of suppression forces on the District, Forest, and Region. This information is obtained daily in a status report from the Kootenai Forest Dispatcher. A shortage of firefighting personnel will affect the decision to allow new ignitions to burn. It will also influence the number of fires permitted to burn at one time and the size fires may attain. Region One Preparedness Levels will be used to determine the fire activity allowed on the District, example PL-2 or less, no restrictions, PL-3 and above, suppress new starts (see appendix G).

G. Boundary Considerations

Whenever a fire approaches another fire management area, a review of the situation will determine whether to take suppression action on that portion which would cross the boundary. A fire may be allowed to burn into an adjacent fire management area if it is in prescription for that area and if approved by the Management Fire Committee.

A management fire will be suppressed if it threatens to cross the boundary into the protected fire management area. If a fire start endangers state or private land, it will be suppressed.

At this time, the Troy District fire plan states that management fires will not be allowed to burn into adjacent Districts and National Forest land. Consequently, management fires near the Troy District boundary will be partially or totally suppressed. In addition, a fire which starts under prescribed conditions may be suppressed if it is too close to the District boundary.

H. Air Quality and Burning Permits

Two permits are required by landowners before using fire on state and private lands. A state air quality permit must be obtained year round. A state burning permit is required from May 1 to September 30. Both are issued at the Troy Ranger District.

I. Ignition Sources

Fires are started in two ways: by people and their activities (man-caused) or by lightning (lightning-caused).

1. Man-Caused. Man-caused fires are most numerous in the residential and recreational areas of the District. People and their activities are responsible for more fires than lightning on the Troy District.
2. Lightning-Caused. Lightning storms (or thunderstorms) reach a seasonal peak during June, July, and August, based on data from the Libby and Sylvanite areas. Thunderstorms occur on an average of three or four days per month. The highest frequency is from June 11 to 21, when 16 percent of the storms occur. Five percent or fewer occurred before May 21 and after September 10.

Ten or more cloud-to-ground discharges are common on about 50 percent of the thunderstorm days during July and August. Cloud-to-ground activity is slightly greater during July than August.

Nearly half the storms begin between 1500 and 2100 m.s.t. Evening storms, those between 1800 and 2400 m.s.t., appear to have greater cloud-to-ground lightning activity.

Lightning data from three lookouts show that 50 to 75 percent of the thunderstorm days in July and August were lightning activity level (LAL) 2, which means storms are isolated. From 10 to 20 percent of the days had LAL 3 (few). Scattered storms (LAL 4) occurred on less than 10 percent of the days. Storms were numerous (LAL 5) on 10 to 20 percent of the thunderstorm days.

VII. PROTECTED FIRE MANAGEMENT AREA

A. Definition

The Troy Ranger District has the responsibility to suppress wildfires on state and private lands within the District. These lands will remain under an immediate suppression policy. Because of life and property values, unplanned fires on state and private lands will continue to be aggressively suppressed in order to minimize the acreage burned. This policy does not totally disallow fire in the protected area. As in the past, landowners who acquire burning and/or air quality permits can use fire for specified purposes.

All the state and private lands comprise one fire management area. The small parcels of Forest Service land surrounded by state and private ownership will have an immediate suppression policy to ensure safety for human life and property. The map inside the back cover shows the location of the protected area.

B. Description

The protected fire management area covers 34,051 acres (13,791 ha), mostly concentrated in valley bottoms along Bull Lake, Lake Creek, Keeler Creek, Callahan Creek, Kootenai River, Ruby Creek, O'Brien Creek, Yaak River, Pine Creek, and Lime Creek. There are parcels scattered on Mount Vernon, Stanley Mountain, Keeler Mountain, Grouse Mountain, and Yaak Mountain.

The steep walls have been scoured by big glaciers while the valley bottom contains deep deposits of ground moraine, outwash terraces, and isolated lacustrine benches. Major faults in and adjacent to the valley have lowered the valley in relation to the surrounding mountains. The elevation ranges from 2000 feet (610 m) along the Kootenai River to 5900 feet (1789 m) peaks at the head of Stanley Creek.

Annual precipitation varies from 30 inches (76 cm) along the Kootenai River to 90 inches (229 cm) at the peaks above Stanley Creek.

The overstory vegetation in the protected area is characterized by seral trees, mainly lodgepole pine, ponderosa pine, Douglas-fir, and western larch. Intense fires in the past have created extensive, even-aged stands of these species. The frequency and severity of past fires have largely maintained the seral status of the forest community and prevented development of the climax stage. In recent years, vegetative succession has been influenced more by logging, homesteading, and agriculture than by fire. Undergrowth species common to the northern Rocky Mountain region occur here, and in addition, exotic species have been introduced from settlement activities.

This area is used for recreation, logging, and mining. Permanent and summer residents live in the valley and adjacent drainages. Some of the land is being cultivated but most residents prefer living in a forest environment. Logging is carried out on a large scale by St. Regis, but lesser operations are run by small landowners. Mining claims vary in size.

C. Fire Occurrence

Fire records for the past 39 years (1940-1978) show 263 fires occurring in the protected area, which is an average of seven fires per year. There were 152 man-caused and 111 started by lightning. Most man-caused fires occurred on lands adjacent to the Kootenai River and in the Bull Lake Valley.

D. Fuels

Model G best represents the overall fuel situation on protected lands. There are small areas of Fuel Model C on Keeler Mountain, Grouse Mountain, and lower Threemile Creek. Interspersed areas of Models I, J, and K occur where logging and thinning operations have been carried out. Total fuel loadings range from 1 to 80 t/a (tons/acre) or 2 to 179 t/ha (tonnes/hectare) in the valleys. On the southern slopes it varies from 5 to 40 t/a (11 to 90 t/ha) and from 5 to 130+ t/a (11 to 291+ t/ha) on northern slopes.

E. Fire Prescription

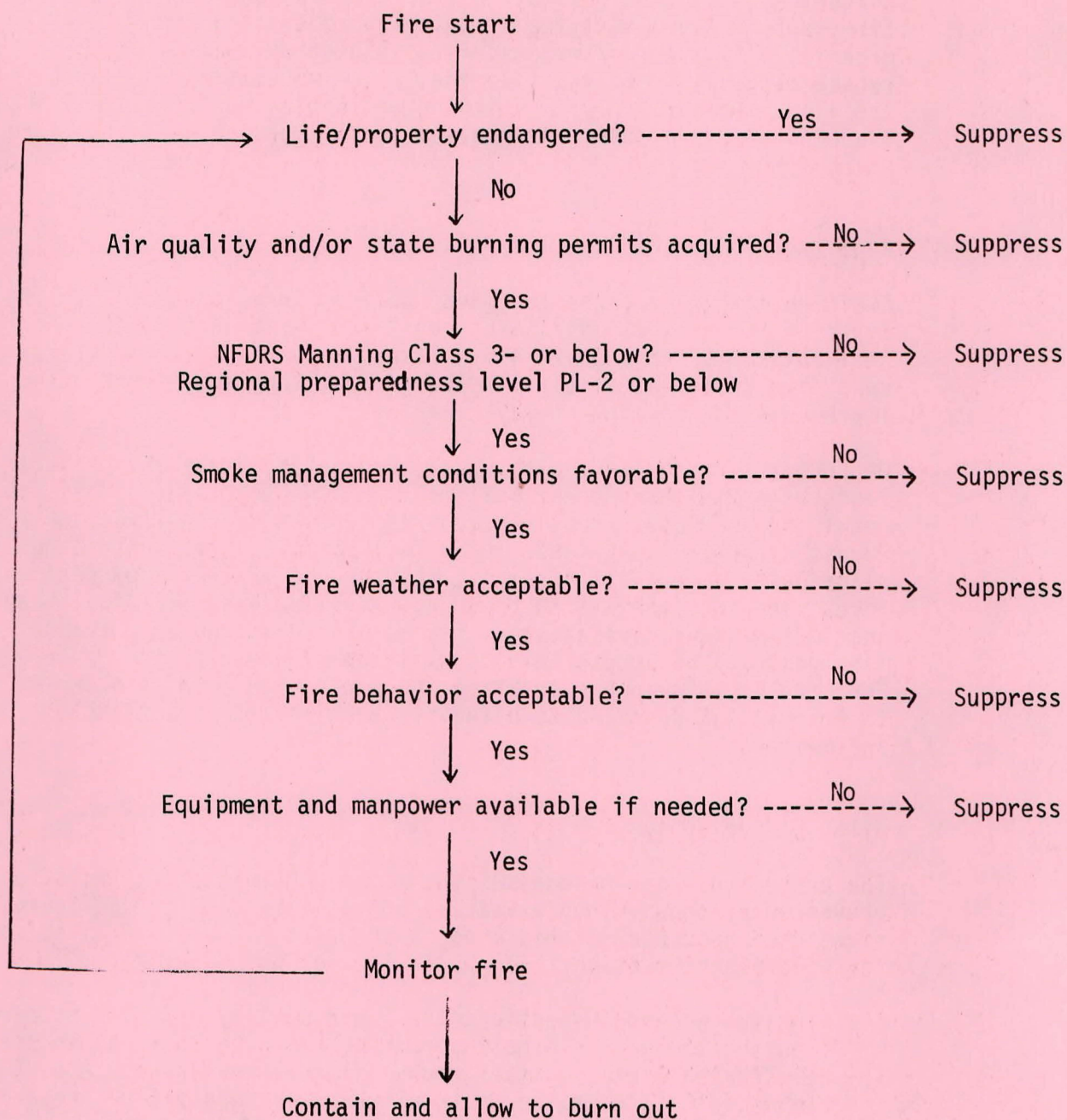
Unplanned fires on state and private lands will be immediately suppressed, to provide protection for life, property, and resources. However, planned fires will continue to be allowed to burn when air quality and/or state burning permits have been acquired, when burning conditions are favorable, and when the necessary control precautions have been taken. The decision flow chart for a fire within the protected lands fire management area is shown in figure 3.

The objectives of using fire on protected lands are:

1. Wildfire hazard reduction of slash: logging, thinning, and land clearing.
2. Vegetation management, such as brush burning and cleaning out ditches.
3. Burning debris from constructing or tearing down buildings and burning rubbish in dumps.

Figure 3

Decision flow chart for fires in the protected fire management area



F. Prescribed Fire

Large landowners, such as St. Regis Paper Company use prescribed fire to clean up debris from logging, road construction, and land clearing. To a lesser extent, fire is used by small landowners to reduce material from land clearing, alter vegetation ("brush burning"), and burn slash from thinning or logging activity. All landowners must acquire air quality and/or burning permits before using fire.

G. Fuel Management

Fuel management on protected lands will be in accordance with the State of Montana RCM 1947, Sections 28-403.1 through 28-408 and Sections 28-410 through 28-413. Essentially this law requires specified treatment of slash rendered from logging, timber stand improvement, and right-of-way clearing.

On Forest Service lands within and adjacent to state and private lands, the fuel management goal will be 100% treatment of all fuels resulting from operations (in accordance with National Regional/Forest direction). Because major fuel build-ups from untreated slash exist on private property, the purpose of 100% treatment on Forest Service lands is to break up fuels, develop fire/fuel breaks, and foster a positive attitude for hazard reduction by private landowners. The Forest Service will coordinate with the Montana Forestry Division representative who works with local landowners to bring about sound, cost effective fuel treatment activities and methods.

H. Wildfire Prevention

The protected area encompasses the major workload of the wildfire prevention program. Approximately 80% of all District man-caused fires have occurred in this area in the past 39 years. The objectives for wildfire prevention shall be in the following priority:

1. On-the-ground inspection of all air quality and burning permits during the pre- and post-season over $\frac{1}{4}$ acre (0.1 ha) in size. Increased public contact emphasizing fire awareness and coordination with the Southwest Lincoln County Fire Prevention Cooperative (a cooperative group involved in local area fire prevention activities).
2. Development of a strong fire prevention inspection program of all powerlines under special use and a coordinated effort with local power companies for increased awareness of fire hazards on lines existing and crossing private lands not under special use permits.

3. Development of a coordinated fire prevention program with Burlington Northern Railroad with emphasis on developing an inspection compliance and fire awareness program. This will be coordinated with the Kootenai National Forest Supervisor's Office.
4. Development of a wildfire prevention and suppression plan with ASARCO Troy Project with emphasis in developing a strong prevention program and fire awareness program for all operations within the Troy Project.
5. Emphasis in effective state industrial fire law enforcement programs for private land inspections.
6. Development of the cooperative plan with the town of Troy and Lincoln County for disposal burning activities of the Troy City Dump, emphasizing a safe burning program.
7. Develop fire prevention awareness through local school programs. Continue presentations to local service clubs regarding fire awareness and wildfire prevention.

I. Wildfire Suppression

The wildfire suppression objective for the protected fire management area is to provide a well-planned and executed wildland fire protection program. The Forest Service is not mandated to fight structure fires. Fire protection will be planned to provide a high degree of regard for safety of life and property and will be fast, energetic, and thorough.

VIII. OPERATIONAL FIRE MANAGEMENT AREAS

A. Definition

Operational fire management areas are forested lands which are being managed primarily for timber and big game as directed by the land use plans. The operational lands have been divided into seven areas using boundaries established by the Forest land use planning process. By using the same boundaries the management of these areas can be directly related to the land planning units and compartments. Also, common names can be retained, thus facilitating recognition of the areas by District and Forest personnel. Furthermore, the fuel management guidelines are being developed in coordination with other activities in the major drainages. The creation of a Forestwide land use plan will not cause these separate areas to lose their integrity.

Because this is the timber producing land on the District, special consideration had to be given to allowing fire. In the past, prescribed fire has been applied to reduce the hazard of debris from logging, timber stand improvement, and road construction and to improve big game habitat. This application will continue. However, as the result of the revised fire policy, a new approach can be taken with unplanned ignitions, whether man-caused or lightning-caused. The approach is modified initial attack on certain fires and permitting management fires in identified big game spring and winter range. Unwanted fires will be suppressed.

1. Big Game Spring and Winter Ranges - Important spring and winter range has been identified for big game animals: elk, deer, black and grizzly bear, bighorn sheep, and moose (see map overlay for each operational area). It is not expected that much range will be affected by unplanned fires; however, the intent of the Troy Fire Plan is to take advantage of those fires which achieve desired results described in the objectives for management fires in the operational areas.

A long-term program has been developed for prescribed burning big game spring and winter ranges on the District. Discussed in a separate document, this browse burning program has established the maximum acreage that should be burned annually on each range. Generally, this is less than 25 percent of the range to ensure that it is not all burned in one year. (See appendix K)

The area of a range burned by prescribed and unplanned fires during a year will be used to calculate the allowable maximum acreage burned annually. Because of the acreage limit, unplanned fires may have to be contained to a certain size.

2. Modified Attack - Modified attack may be taken on unwanted fires on Manning Class 3-minus day or less (low to moderate fire danger). This depends on assessment of a fire in regards to risk to life and property, resources, weather, fuels and fire suppression priorities. For example, low risk fires that require extensive travel during the night, particularly over hazardous terrain, may not be manned until daylight. Or, lightning fires in remote areas which occur late in the day or during heavy rains may not be manned until the following day or after the thunderstorm passes. Or, a

small crew with hand tools can be sent to control a fire instead of dispatching a large crew, tankers, or air retardant. When the fire danger is high or the situation not suitable for modified attack, the attack will be immediate with full suppression forces.

The reasons for modified attack are:

- economic suppression (e.g. strength of force, mode of suppression)
- wet or hazardous weather
- time of day and accessibility of fire
- number of fire starts (suppression priority)
- crew safety
- most logical method of attack

O'Brien Creek supplies water for the town of Troy. All fire activities in this watershed will follow the criteria presented in guidelines and requirements for operations in municipal watershed (Forest Service Manual).

B. Madge Creek Area

1. Description

The Madge Creek Fire management area encompasses 4147 acres (1679 ha) in the southeastern part of the District (figure 3). It is bordered on the north, east, and south by the Cabinet Slopes observation area. Protected lands in Bull Lake Valley lie on the western edge.

Long, uniform slopes are deeply cut by stream lines. Much of the area is quite steep. Elevations range from 2500 feet (762 m) along Camp Creek to 6200 feet (1890 m) near Doonan Peak.

Annual precipitation ranges from 30 inches (76 cm) near the valley bottom to 70 inches (178 cm) in the higher elevations. Approximately half may occur as snow.

Most of the Madge Creek area is classified as TSHE/CLUN h.t. Drier sites at lower elevations are PSME/PHMA h.t., and small sections throughout the drainage are by ABGR/CLUN, ABLA/MEFE, and ABLA/XETE h.t.s. Fire has kept most of the area in seral stands composed of a mixture of ponderosa, Douglas-fir, larch, white pine, lodgepole, and spruce. Climax stands dominated by hemlock, Douglas-fir, grand fir, and subalpine fir comprise a small portion of the area. The undergrowth is characterized by shrubs and herbs associated with these habitat types.

Logging is the primary land use in the Madge Creek Area. Other uses include huckleberry picking, hunting, snowmobiling, skiing, and access to the Cabinet Mountains Wilderness.

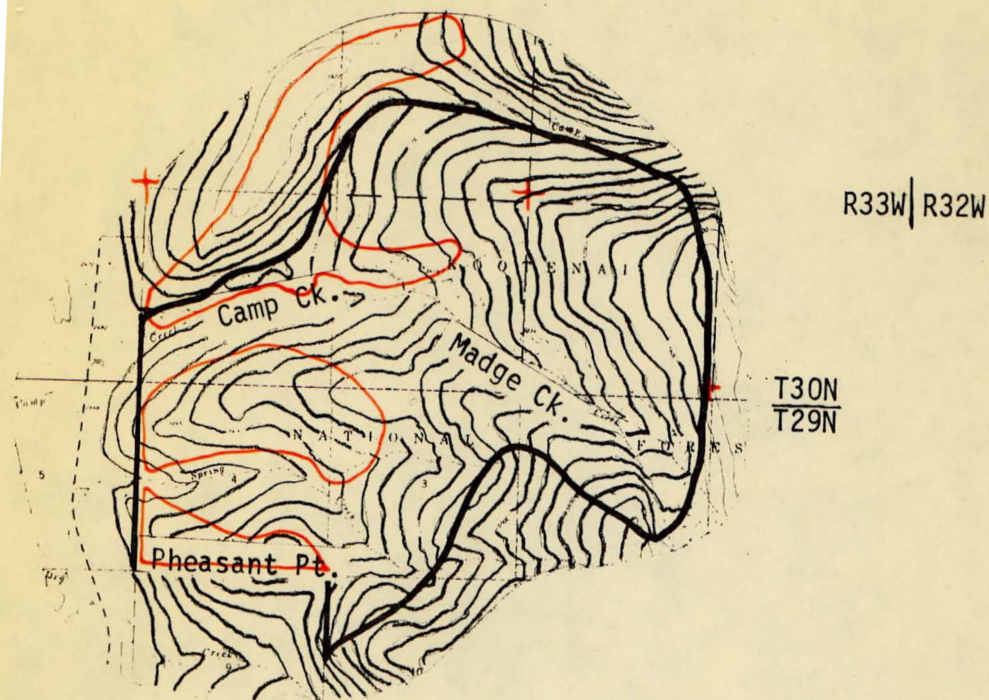
2. Fire Occurrence

Since 1940, four lightning fires have been reported but no man-caused fires. Based on the record from 1940 to 1978, the average frequency is one every 10 years. All fires were confined to Class A.

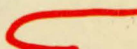
In 1936, a fire burned a large area on the west face of Doonan Peak above Spring Creek and on the slope northeast of Madge Creek. Fire-scar evidence shows that small-area fires repeatedly occurred on dry slopes with low fuel loadings and open-grown trees.

Figure 4.

Madge Creek operational fire management area.



BIG GAME RANGE

 existing

 proposed

3. Fuels

Forest fuels are represented mostly by Fuel Model G and some Model H where tree cover is continuous. Models I, J, and K occur with logging and thinning activities. In the drier habitats, fuel loadings are lowest. On south slopes the total fuel loading ranges between 3 and 20 t/a (7 and 45 t/ha), while on north slopes it is from 15 to 80 t/a (34 to 179 t/ha).

C. Spar Lake Area

1. Description

The Spar Lake fire management area is located on the southern edge of the District (figure 4). The 29,497 acres (11,946 ha) are bordered on the west by the Sawtooth Mountain observation area and the Idaho Panhandle National Forest. The Cabinet District (Kootenai National Forest) lies to the south, and on the east protected state and private land in Bull Lake Valley forms the boundary. The Keeler Creek and Timber-Rattle Mountains observation areas border the north end.

Upper elevations and ridgetops have been strongly modified by frost action and glacial scouring. Consequently, local relief is relatively low. Sharp topographic contrast is found on oversteepened slopes which have been extensively scoured. Overall elevations range from 2200 feet (672 m) where Ross Creek drains into Bull Lake to 6600 feet (2012 m) on the peaks south of Drift Creek.

Precipitation throughout the year ranges from 35 inches (89 cm) to 90 inches (229 cm). Especially in the higher elevations, more than half can occur as snow.

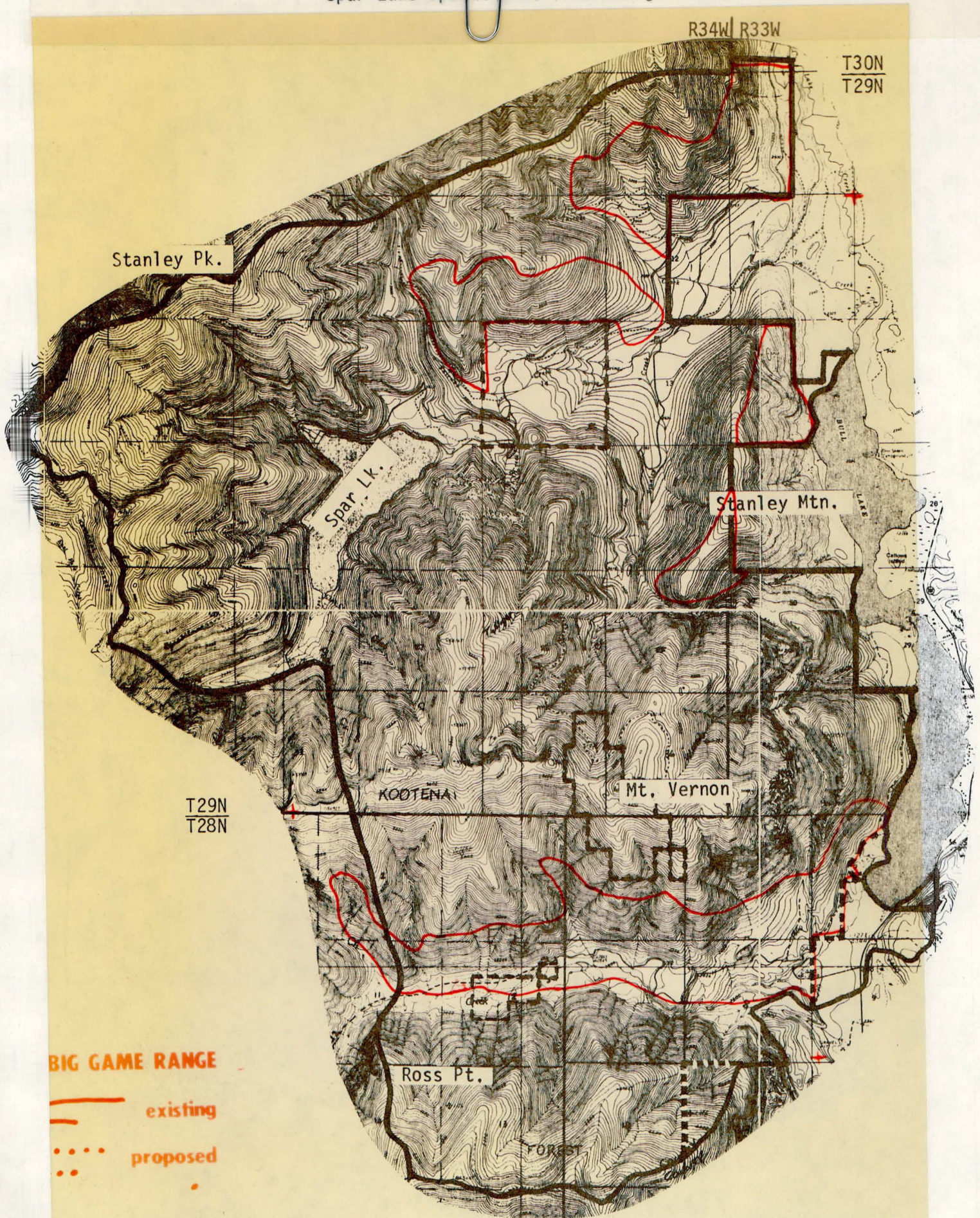
The Spar Lake area contains some very cool, mesic sites and most of the forest is classified as TSHE/CLUN h.t. Other prominent moist types are THPL/CLUN and THPL/OPHO h.t.s. Drier, colder sites are ABLA/XETE and ABLA/MEFE h.t.s. and on south facing slopes, limited areas of PSME/PHMA and PSME/LIBO h.t.s. are found. They are relatively dry types in this forest environment. Seral conifer species dominate the slopes as a result of past fires. In ravines and creek bottoms grow climax stands of cedar and hemlock which have escaped disturbance for centuries. The undergrowth species are typical of these habitat types.

Land uses include logging, sightseeing, huckleberry picking, hunting, hiking, and mining. Wildlife habitat and watershed are other important resources.

2. Fire Occurrence

Thirty-eight fires have been reported in the Spar Lake area from 1940 to 1978, which is an average of one per year. Of these, 35 were related to lightning and three were man-caused. Thirty were Class A, seven were Class B, and one was Class C.

Figure 5
Spar Lake operational fire management area.



BIG GAME RANGE

existing

proposed

Fires burned extensively in the continuous forests growing on the slopes in the Spar Lake area. The result was even-aged stands of predominately seral species trees. Around 1890, a fire swept through much of the Ross Creek drainage killing all but the moist stands along the creek. High elevation fires remained small in the sparse, discontinuous fuels.

3. Fuels

Forest fuels vary from climax cedar/hemlock stands to dense stands of seral trees. Fuel Model G best represents the area where tree cover is continuous. Models I, J, and K apply where logging and thinning have occurred. Open-grown stands on exposed slopes are Model C. On the mountaintops and ridges, the overstory density decreases and in some rocky areas the cover is absent. Total fuel loadings range from 5 to 40 t/a (11 to 90 t/ha) on south slopes and from 15 to 100 t/a (34 to 224 t/ha) on north slopes.

D. Keeler Creek Area

1. Description

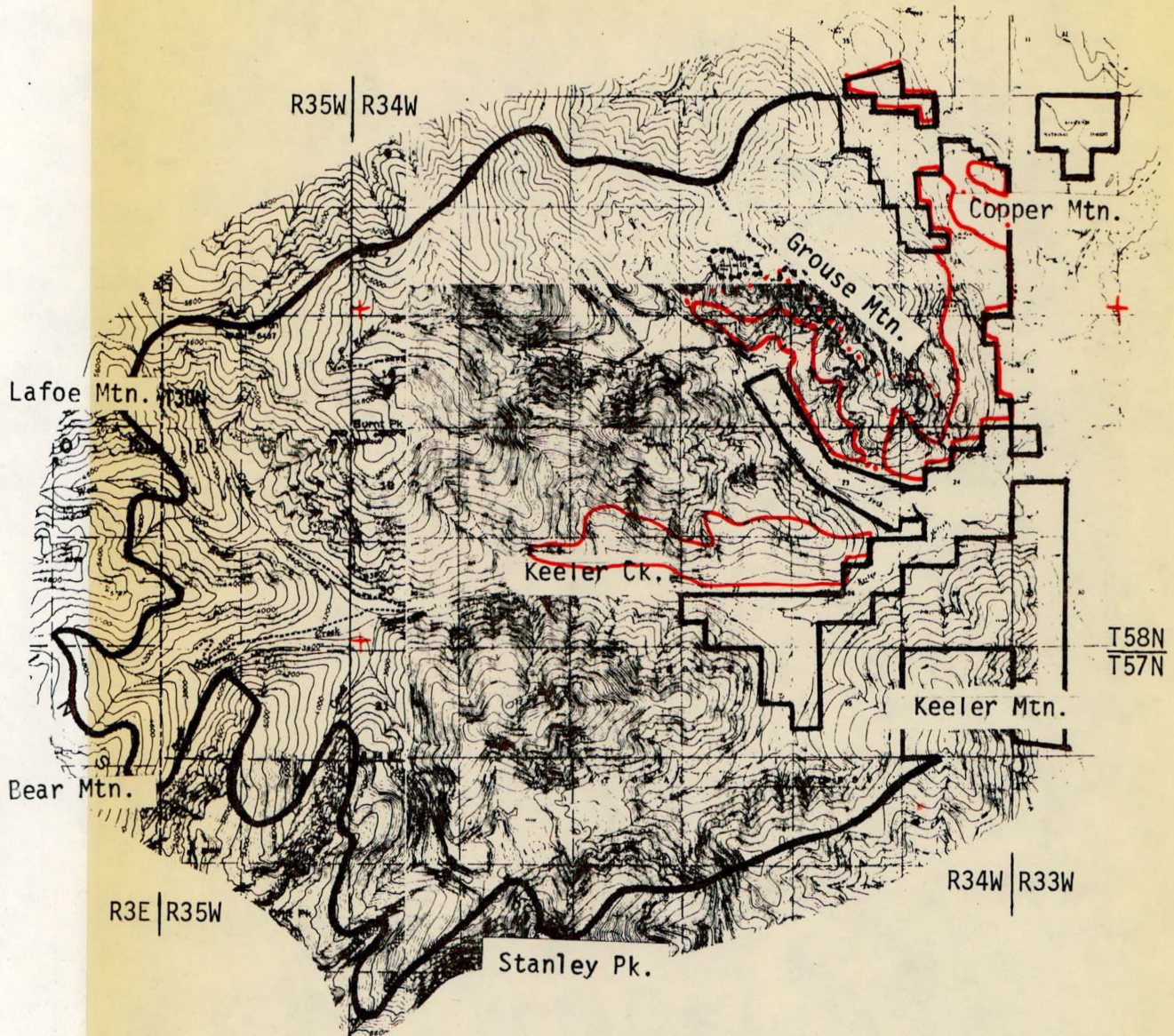
The Keeler Creek fire management area comprises approximately 38,943 acres (15,771 ha) located on the west side of the District between Bull Lake Valley protected area and Timber-Rattle Mountains observation area (figure 5). To the north and south are the Callahan and Spar Lake operational areas, respectively.

Sharp topographic features are found on a small portion of the area where oversteepened rocky slopes have been carved by alpine glaciers. Higher elevations and ridgetops have been modified by erosion, frost action, and glaciers. Consequently local relief is relatively minor. Except on the western edge, slopes are generally long and uniform. Elevations range from 2200 feet (671 m) by Bull Lake to 6437 feet (1962 m) at Survey Mountain.

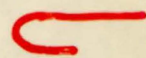
Annual precipitation ranges from 35 inches (89 cm) to 95 inches (241 cm). Up to 75 percent occurs as snowfall.

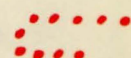
Most of the Keeler Creek operational area is classified as TSHE/CLUN h.t. On drier aspects, PSME/PHMA h.t. is prominent and on the ridges subalpine fir habitats are found--ABLA/LUHI, ABLA/MEFE, and ABLA/XETE h.t.s. On a few moist sites, ABLA/CLUN h.t. occurs. Past fires have promoted seral, shade-intolerant conifers, especially Douglas-fir, larch, lodgepole, white pine, and ponderosa which are most abundant on the drier lower slopes at the east end of the Keeler Creek area. In the western half, particularly along creeks and in ravines, cedar, hemlock, spruce, grand fir, and subalpine fir are dominant because they are better adapted to cold temperatures and moist conditions. Even on slopes in the western portion, these species are often more abundant because of their superior adaptation to cold, moist sites. Past fires have maintained seral forest stands because only about 20 percent of the forest stands are over 120 years old. Undergrowth species in the area are common for these habitat types.

Figure 6
Keeler Creek operational fire management area.



BIG GAME RANGE

 existing

 proposed

Logging is a major land use in the Keeler drainage. Other uses include fishing, hunting, huckleberry picking, viewing, skiing, snowmobiling, and mining. Wildlife habitat and watershed are other resources.

2. Fire Occurrence

From 1940 to 1978, 46 fires have been reported in the Keeler Creek area, an average of one per year. Of these, nine were man-caused and 37 were lightning-caused, but most were small: 38 fires were contained to Class A and 8 to Class B.

Fires have burned extensively in this drainage, the most notably around 1850. The result has been a predominance of seral trees, and often a stand is composed almost entirely of one species. Small-area fires occurred in the high elevations.

3. Fuels

Forest fuels vary from mature cedar/hemlock stands along Keeler Creek to forested rock slopes. Fuel Model G best represents continuous forests but Model C applies to stands on Grouse and Keeler Mountains where open-grown pines grow. Models I, J, and K apply to logged and thinned sections. On south slopes the total fuel loading varies from 3 to 30 t/a (7 to 67 t/ha), and on north slopes it is from 15 to 80 t/a (34 to 179 t/ha).

E. Callahan Creek Area

1. Description

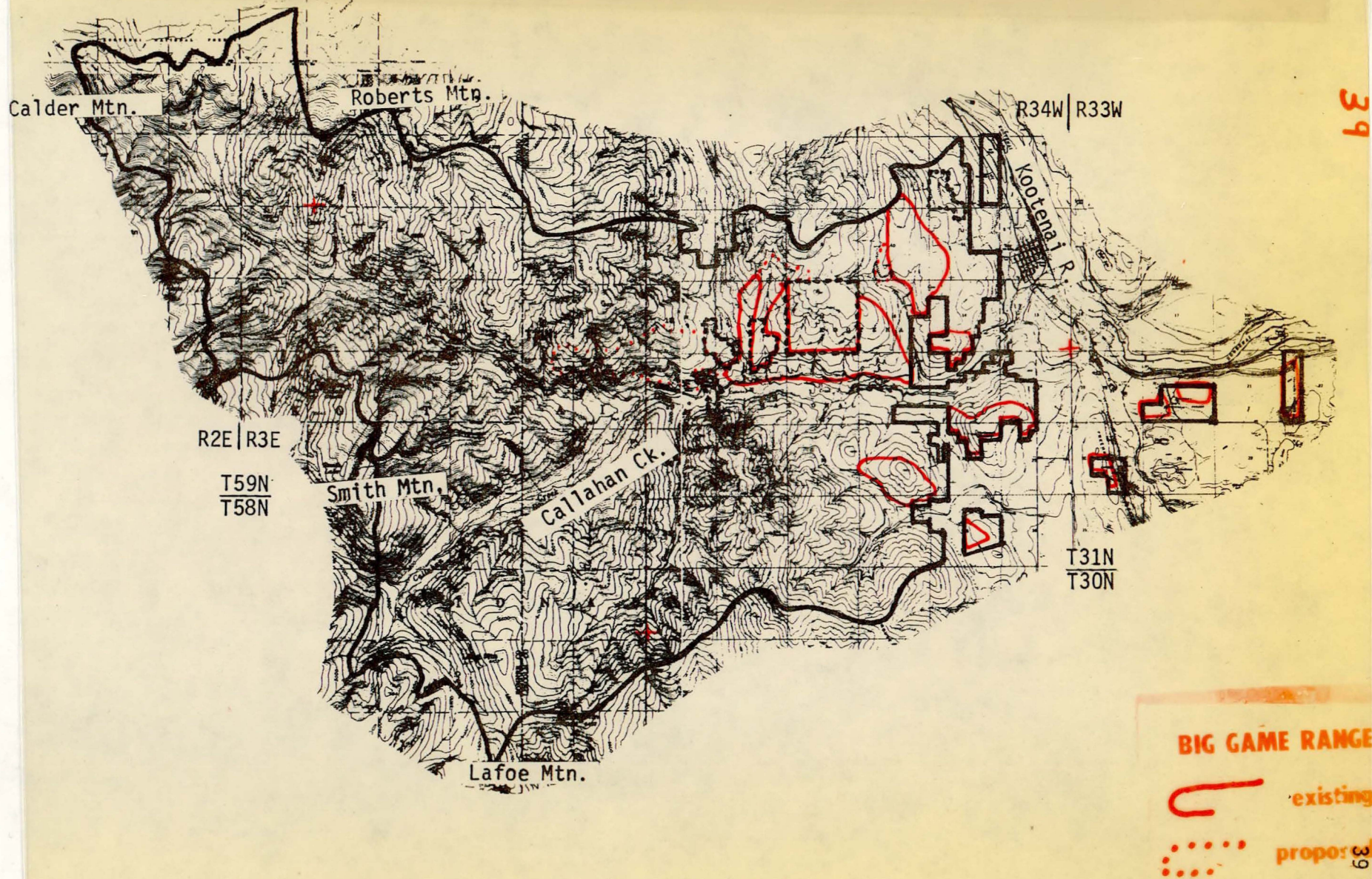
The Callahan Creek fire management area covers 52,164 acres (21,127 ha) located in the middle of the District west of Troy. It is surrounded by protected lands on the east, Keeler Creek operational area to the south, Timber-Rattle Mountains observation area to the west, and Star Creek operation area to the north (figure 6).

Most of the area is a transition between foothills around Troy and high elevation alpine glacier landform to the west where deeply eroded drainages with steep slopes are common. Slopes are generally long and uniform. Elevation ranges from 2000 feet (610 m) along the Bull Lake Highway to 6675 feet (2035 m) at Roberts Mountain.

Annual precipitation varies from 25 inches (64 cm) at the mouth of Callahan Creek to over 80 inches (203 cm) in higher elevations. Up to 75 percent can fall as snow.

TSHE/CLUN h.t. is the predominate habitat classification in the Callahan Creek operational area. On drier sites at low to middle elevations, PSME/PHMA and PSME/XETE h.t.s are prominent. ABLA/CLUN, ABLA/XETE, and ABLA/MEFE h.t.s are found on ridgetops and higher elevations. Moist ravine, slope, and streamside sites are occupied by ABGR/CLUN and THPL/OPHO h.t.s. Douglas-fir,

Figure 7
Callahan Creek operational fire management area.



larch, lodgepole pine, white pine, and ponderosa pine are most abundant on the drier slopes and lower elevations. Hemlock, cedar, spruce, subalpine fir, and grand fir are more dominant in the western portion because they are more adapted to cold temperatures and moist conditions. Past fires have kept much of this area in seral successional stages. Only about 25 percent of the stands are over 120 years old. Undergrowth species are those typical of these habitat types.

Logging is a major activity in the Callahan Creek area. Other land uses include mining, fishing, hunting, huckleberry picking, sightseeing, skiing, snowmobiling. Watershed and wildlife habitat are other resources.

2. Fire Occurrence

Records from 1940 to 1978 show that 61 fires have been reported which is an average of three fires every two years. Reportedly six were man-caused and 55 were lightning-caused. Nineteen fires were Class A, 18 were Class B, and three were Class C.

Climax stands in ravines and along streams are evidence these moist sites often escaped intense fires which destroyed the surrounding forests. A fire which burned through much of the area about 1850 has resulted in extensive stands of predominately seral trees. The rocky topography and scattered fuels keep high elevations fires small.

3. Fuels

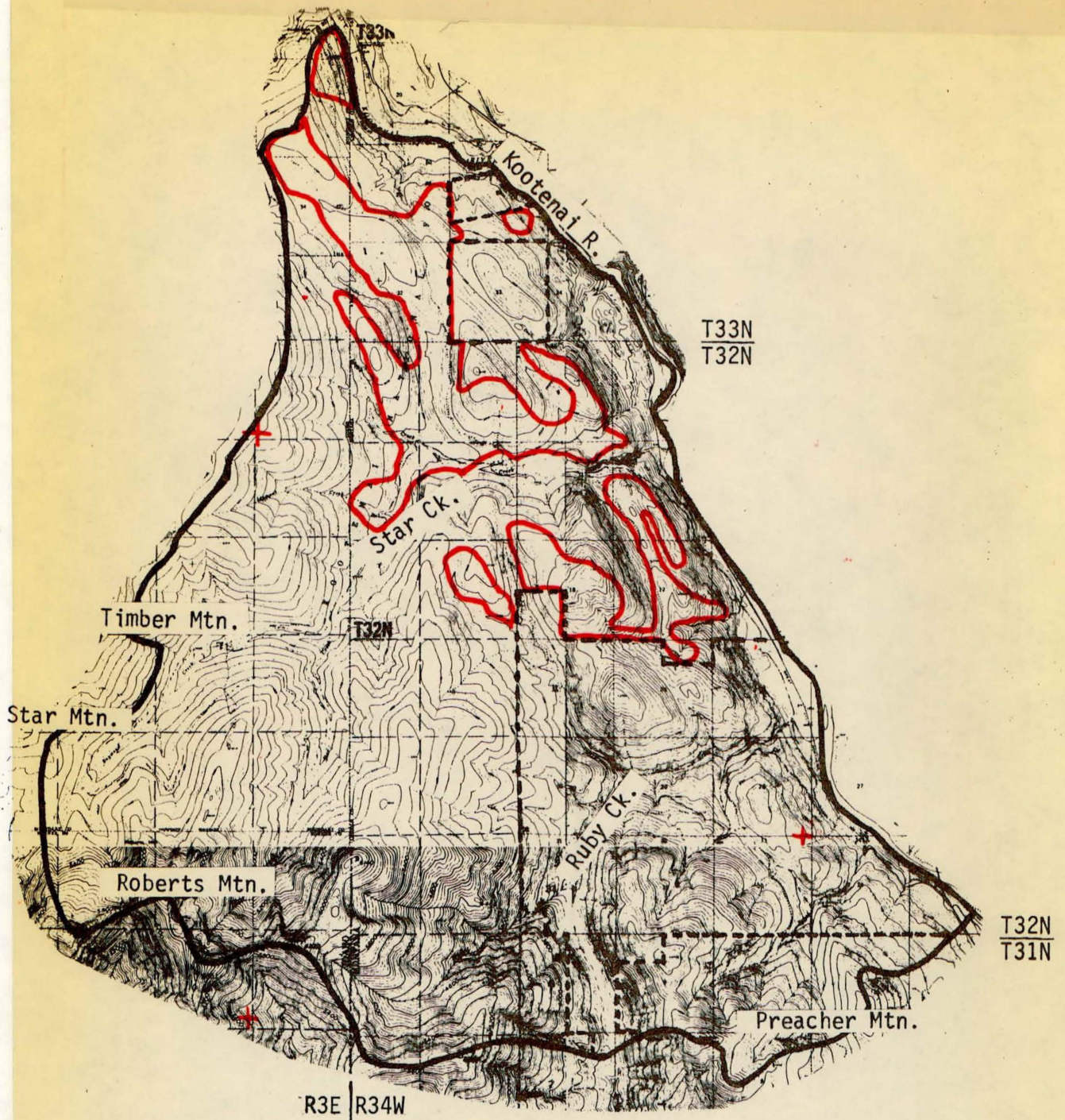
Forest fuels vary from mature cedar/hemlock stands along Callahan Creek to forested rock slopes. Fuel Model G best represents continuous forest but around Grouse Mountain and Lower Threemile Creek, open-grown pine stands are classified as Fuel Model C or H. On logged and thinned sites, Models I, J, and K apply. Total fuel loadings range from 10 to 100 t/ha (22 to 224 t/ha) on valley bottoms from 5 to 40 t/a (11 to 90 t/ha) on south slopes, and 15 to 100 t/a (34 to 224 t/ha) on north slopes.

F. Star Creek Area

1. Description

The Star Creek fire management area comprising about 35,712 acres (14,464 ha) is located in the northern half of the District where it is bordered on the north and east by protected lands and the operational areas of Pine Creek and O'Brien Creek (figure 7). The Callahan Creek operational area lies to the south, and the Timber-Rattle Mountains observation area and Idaho Panhandle Forest border on the west.

Figure 8.
Star Creek operational fire management area.



BIG GAME RANGE

 existing

 proposed

The topography is generally subdued because of continental glaciation. Most of the area is a transition between foothills along the Kootenai River and the high elevation terrain carved by alpine glaciers along the western edge. In the southwest portion of the area, deeply eroded drainages with steep slopes occur. Throughout the areas slopes are generally long and uniform. Elevation ranges from 1800 feet (549 m) at the Kootenai River to 6675 feet (2035 m) at Roberts Mountain.

Yearly precipitation ranges from 30 inches (76 cm) near the Kootenai River to over 80 inches (203 cm) in the mountains. Over half may occur as snowfall.

TSHE/CLUN h.t. is the most widespread habitat type in the Star Creek area. PSME/PHMA and PSME/CARU h.t.s occur on drier aspects and on moist, protected aspects, ABGR/CLUN and THPL/CLUN h.t.s are found. At the higher elevations and on ridges ABLA/CLUN, ABLA/XETE, and ABLA/MEFE h.t.s occur. The shade intolerant species Douglas-fir, larch, white pine, and ponderosa pine dominate except in the high elevations, ravines and creek bottoms. On these sites sub-alpine fir, spruce, hemlock, and cedar are most abundant because they are best adapted to moist, cold conditions. Past fires have promoted and maintained the seral forest composition. The east side of the Star Creek Drainage and the upper elevations of the north fork of Ruby Creek are covered with an even-aged stand about 70 years old which arose after a fire. Grass, herb, and shrub species in this area are typical of the habitat types.

One of the main land uses is timber harvesting. Other uses include fishing, hunting, huckleberry picking, viewing, mining, skiing, and snowmobiling. Wildlife habitat exists throughout the area.

2. Fire Occurrence

From 1940 to 1978, records show that 79 fires have been reported in the Star Creek area, which is about two fires per year. Man-caused fires number 18, and lightning was responsible for 61. Most were small since 63 fires were contained to Class A and 13 to Class B. Three fires reached Class C size.

Fires have burned extensively in some of the Star Creek area yielding stands primarily composed of seral tree species. A fire which burned around 1900 is responsible for seral stands over a large part of the area. Moist conditions and discontinuous fuels restricted fire spread in some of the area.

3. Fuels

Forest fuels are fairly continuous except in logged areas or natural openings. Fuel Model G best suits continuous forest but where fuel loadings are light, Model H is more applicable. Models I, J, and K apply to logged and thinned sites. The total fuel loadings range from 5 to 80 t/a (11 to 179 t/ha) on the valley bottoms, from 5 to 40 t/a (11 to 90 t/ha) on south slopes, and from 15 to 80 t/a (34 to 179 t/ha) on north slopes.

G. Pine Creek Area

1. Description

The Pine Creek fire management area encompasses 21,518 acres (8714 ha) in the north portion of the District (figure 8). It is bordered on the northeast by the Cross Mountain observation area and by the Yaak Ranger District (Kootenai National Forest). To the southeast and southwest are the O'Brien Creek and Star Creek operational areas. The Idaho Panhandle National Forest forms the western boundary and state and private land is dispersed throughout.

Terraces and benches blend with the deeply incised rock faces along the Kootenai River, Pine Creek, and Yaak River. The mountain terrain between Pine Creek and the Kootenai River has been extensively scoured by the continental glacier, therefore, slopes are long and uniform. Elevations range from 1800 feet (549 m) near the Kootenai to 5600 feet (1707 m) near Cross Mountain.

Annual precipitation ranges from 25 inches (64 cm) to 70 inches (178 cm). Much of it is snow, but the snowpack does not last long on south aspects.

Most of the Pine Creek operational areas is classified as PSME/PHMA h.t., which is generally found on the southerly aspects. On protected aspects and moist benches and terraces, TSHE/CLUN and ABGR/CLUN h.t.s occur. Fire has kept most of the tree cover in seral stages. Less than 20 percent of the overstory is older than 120 years. While ponderosa, larch, Douglas-fir, white pine, and lodgepole dominate, the shade tolerant species spruce, hemlock, cedar, and grand fir comprise a notable portion of the overall forest composition. If the forest were undisturbed for centuries these shade intolerant species would dominate the mesic sites. The undergrowth is characterized by species associated with these habitat types.

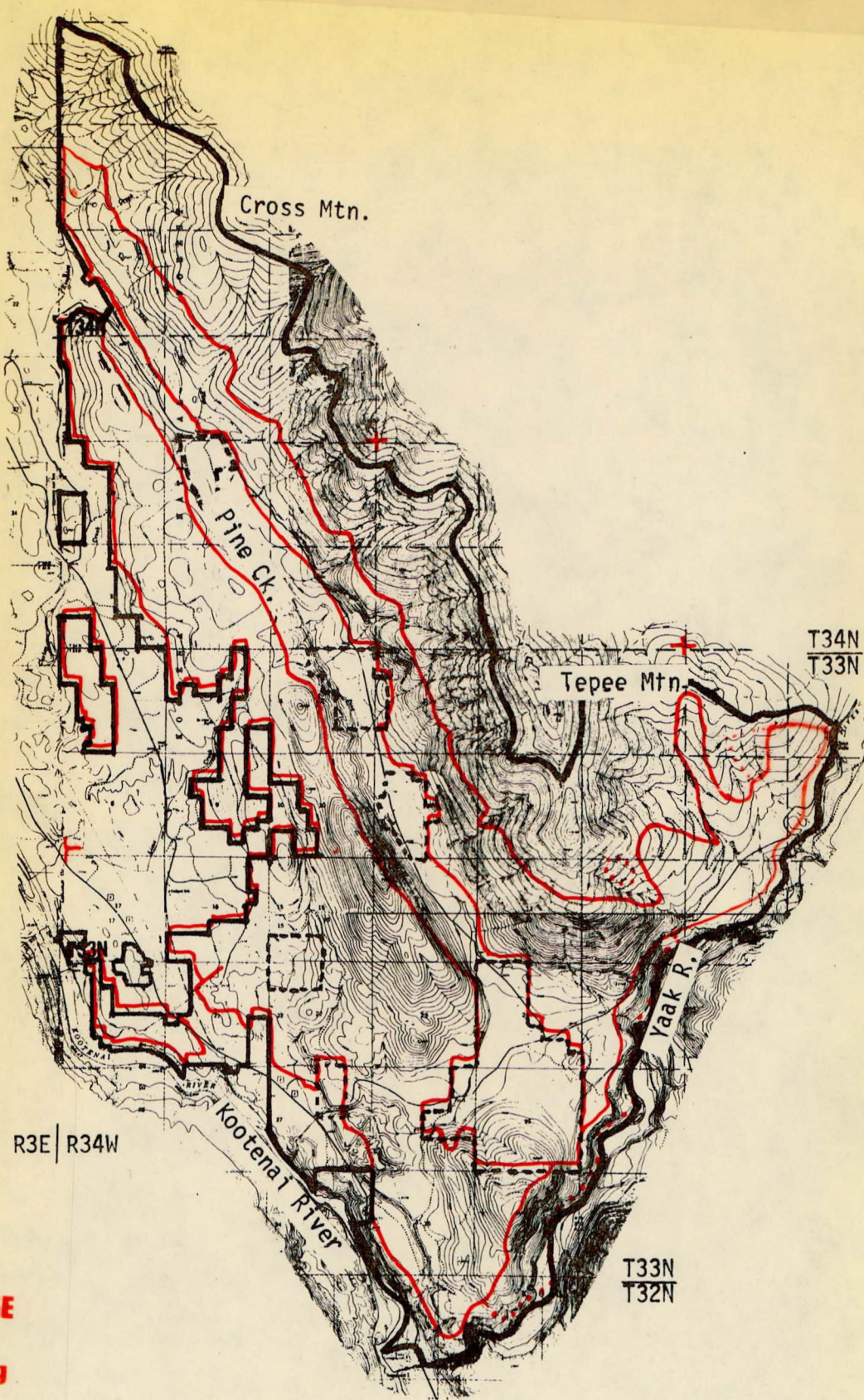
Hunting, camping, fishing, berrypicking, sightseeing, and winter sports are recreational opportunities in the Pine Creek area. Mining and logging are also important land uses. Wildlife habitat is another resource.

2. Fire Occurrence

Since 1940, 55 fires have been reported, an average of three fires every two years. Sixteen were man-caused and 39 were lightning-caused. Most were small fires: 44 were contained to Class A and ten to Class B. Only one was Class C.

Fires have burned extensive areas in this drainage. The effect is a predominance of seral trees, many of which originated after a fire which burned around 1850. Often the overstory will be dominated by a single tree species.

Figure 9
Pine Creek operational fire management area.



BIG GAME RANGE

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3. Fuels

Forest fuels are essentially continuous except in natural openings or at sites of timber harvesting or agricultural activity. Fuel Model G is the best representation. However, Models C or H may be more applicable in open-grown stands with light fuel loadings. On logged and thinned sites, Models I, J, and K fit best. The total fuel loadings range from 5 to 50 t/a (11 to 112 t/ha) on the valley bottom, from 10 to 50 t/a (22 to 112 t/ha) on the north slopes, and from 3 to 15 t/a (7 to 34 t/ha) on the south slopes.

H. O'Brien Creek Area

1. Description

The O'Brien Creek fire management area lies in the northeast portion of the Troy District and entails about 60,377 acres (24,453 ha), (figure 9). The Libby Ranger District covers most of the north and east boundary, but Arbo Mountain observation area also lies on the north boundary. State and private lands form the southern and western edge with the Pine Creek operational area which is on the northwestern boundary.

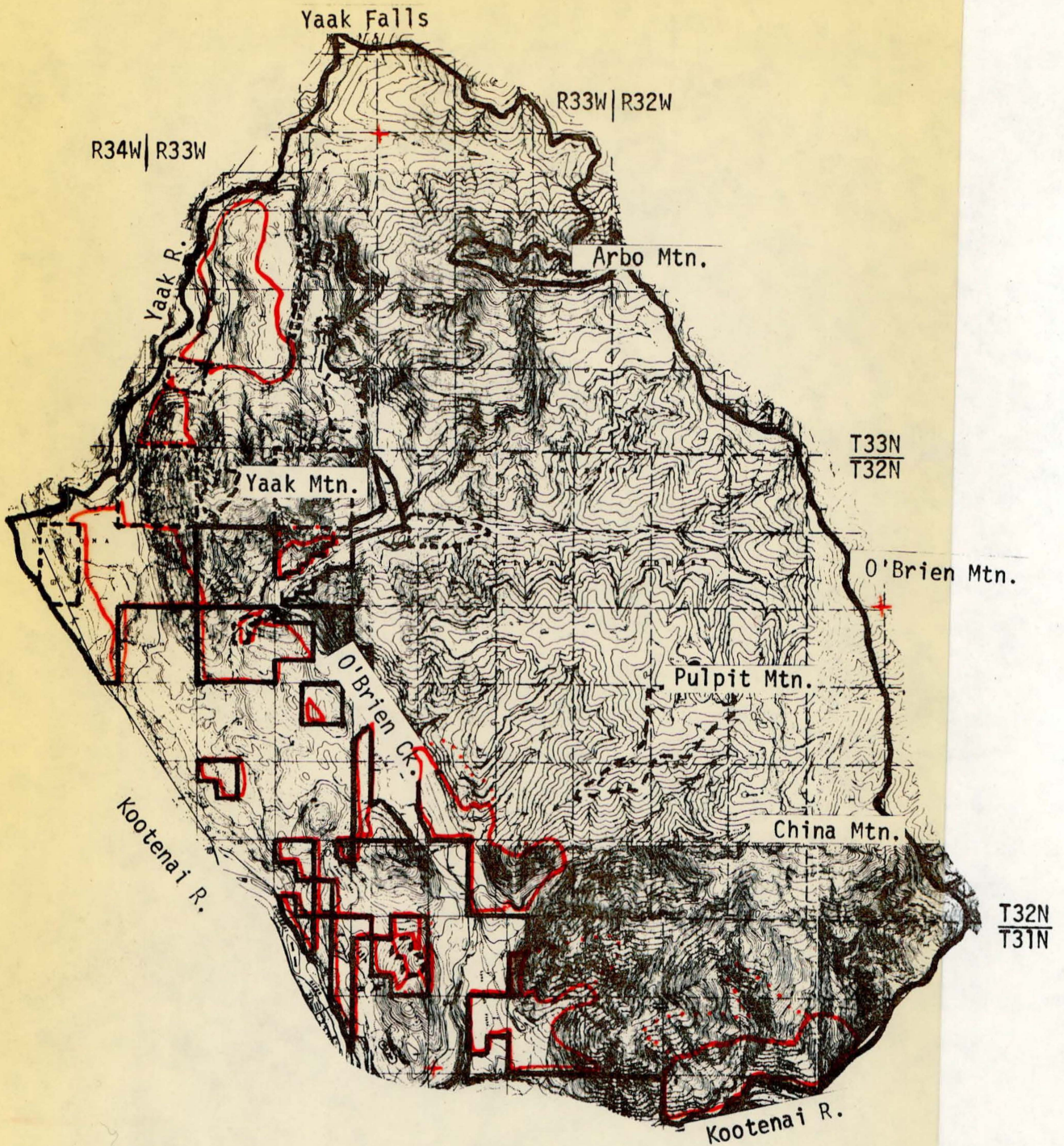
Benches and terraces occur along the Kootenai and Yaak Rivers often below deeply incised rock faces. Slopes are long and uniform with deeply entrenched drainages and often they are quite steep. Elevations range from 1800 feet (549 m) along the Kootenai River to 6770 feet (2063 m) at O'Brien Mountain.

Annual precipitation varies from 25 inches (64 cm) along the Kootenai River to 75 inches (191 cm) near O'Brien Mountain. Much is snowfall, but snowpack does not last long on southerly aspects.

TSHE/CLUN, ABGR/CLUN, and THPL/CLUN h.t.s prevail on moist sites while drier aspects are PSME/PHMA and PSME/CARU h.t.s. Most of the area is covered by seral stands of trees. In fact, less than 20 percent of the overstory is more than 120 years old. Past fires are responsible for perpetuating the shade intolerant trees ponderosa, lodgepole, western larch, Douglas-fir, and white pine. However, the shade tolerant species hemlock, cedar, spruce, sub-alpine fir and grand fir comprise a significant portion of stands on moist sites. Without periodic disturbances, the shade tolerant trees would become widely dominant. The undergrowth is characterized by plants associated with these habitat types.

Logging is an important land use in this area as well as camping, fishing, berry picking, mining, hunting, and winter sports. Suitable wildlife habitat exists throughout, notably the bighorn sheep range. O'Brien Creek drainage is the watershed for Troy.

Figure 10.
O'Brien Creek operational fire management area.



FIRE GAME RANGE

existing
proposed

2. Fire Occurrence

From 1940 to 1978, 101 fires have been reported in the O'Brien Creek fire management area. Of these, 14 were man-caused and 87 were lightning-caused, which is an average of five fires every two years. Seventy-five fires were Class A, 23 were Class B, and three were Class C.

Extensive fires burned the forested slopes resulting in even-aged stands of mainly seral trees. Many stands are the result of fires which occurred since 1850. On the rocky sites with discontinuous fuels, small-area fires are characteristic.

3. Fuels

Forest fuels are essentially continuous but logging, agriculture, and natural openings create breaks in the tree cover. Fuel Model G best represents continuous forest while Models I, J, and K suit logged and thinned sites. Open stands of pine on the face of Kootenai Mountain qualify as Model C. The total fuel loadings range from 5 to 80 t/a (11 to 179 t/ha) on the valley bottoms, from 15 to 80 t/a (34 to 179 t/ha) on north slopes, and from 5 to 40 t/a (11 to 90 t/ha) on south slopes.

I. Fire Prescription

Management fires will be allowed on big game spring and winter ranges identified on the map overlays for each operational area. Figure 10 is the decision flow chart for fires which occur on the identified ranges. The flow chart will be reviewed at least once daily to review if a fire is within the prescription criteria.

The objectives of allowing management fires in the operational areas are:

1. Improve the big game spring and winter ranges by increasing forage availability and productivity.
2. Enhance plant and animal diversity by retaining fire-maintained vegetative communities.
3. Reduce unnatural fuel accumulations on spring and winter ranges for big game.

Elsewhere in operational areas, fire will be suppressed. However, modified initial attack may be taken on Manning Class 3-minus days or less. Delayed or modified attack will reduce costs on low risk fires because of expenditures saved on overtime for nighttime search and suppression and on the size of the suppression force sent. Also, crew safety will be favored by travel during daylight hours and after hazardous weather. Figure 11 is the decision flow chart for modified initial attack on fires.

J. Prescribed Fire

Operational areas receive the greatest application of prescribed fire for hazard reduction of slash from logging, timber stand improvement, and rights-of-way construction. Fire has been increasingly used to improve wildlife habitat, specifically big game spring and winter ranges. The wildlife browse burning program discusses the details of this prescribed burning project on the Troy District. Fire is also planned to increase the production of huckleberries in some popular picking sites. Prescribed fire will continue to be a valuable management tool on operational lands.

K. Fuel Management

The purpose of fuel management is to integrate fire planning, vegetative manipulation, and hazard reduction into an effective program that analyzes short term, operational level, and long term program planning. Fuel management guidelines for the operational areas will be developed as Part II of the total Fire Management Plan for the Troy District. The objectives of fuel management are:

1. Identify potential conflicts between prescribed fire and resources.
2. Reduce or break up extensive concentration of hazardous fuels and create barriers (fire/fuel breaks).
3. Plan and implement restrictions of use and/or closure needed to protect the forest during critical fire danger.
4. Identify and employ fire precautions needed for planned special land uses and mineral activities.
5. Insure that wildfire prevention and suppression plans identify unique resource values to be protected.
6. Delineate areas where use of fire should not be used for vegetative manipulations. Some factors to consider are soil and site conditions, plant species, slope, aspect, esthetics, fire hazards, and wildlife value.
7. Recognize fire management's responsibility to maintain or improve air quality through:
 - increased prevention of wildfires
 - appropriate pre-fire management prescription, inventory, and fuel modification
 - scientific prescribed burning practices
 - energetic wildfire suppression

8. Coordinate preattack and fuel management plans with timber sale activities.

L. Wildfire Prevention

This area encompasses the second heaviest workload for the District wildfire prevention program. From the period of 1940-1978, 66 man-caused fires occurred out of a total of 384 fires. The objectives of the wildfire prevention program within the operational areas shall be as follows:

1. On-the-ground inspection of all road right-of-way timber sale burning prior to issuing burning permits (from May 1 through October 15).
2. A strong industrial operations fire prevention (inspection and awareness) program will be emphasized by priority in the Star Creek, Pine Creek, O'Brien Creek, Keeler Creek, Callahan Creek, Spar Lake and Madge Creek operational areas.
3. During peak recreational activity, including the huckleberry picking season, emphasis will be given to personal contact by the Recreation Technician and Fire Prevention Specialist.
4. All main access roads to operational areas will have an entry portal sign carrying a Fire Prevention message.

M. Wildfire Suppression

The wild fire suppression objective for the operational fire management areas is to provide well planned and executed fire use and protection programs. Fire suppression will be fast, energetic, and thorough with a high degree of regard for safety of life, property, and resources. If a wildfire escapes initial attack, an escaped fire situation analysis will be made to determine the most logical and cost-effective suppression method.

Figure 11

Decision flow chart for fires on big game spring and winter ranges in the operational fire management areas

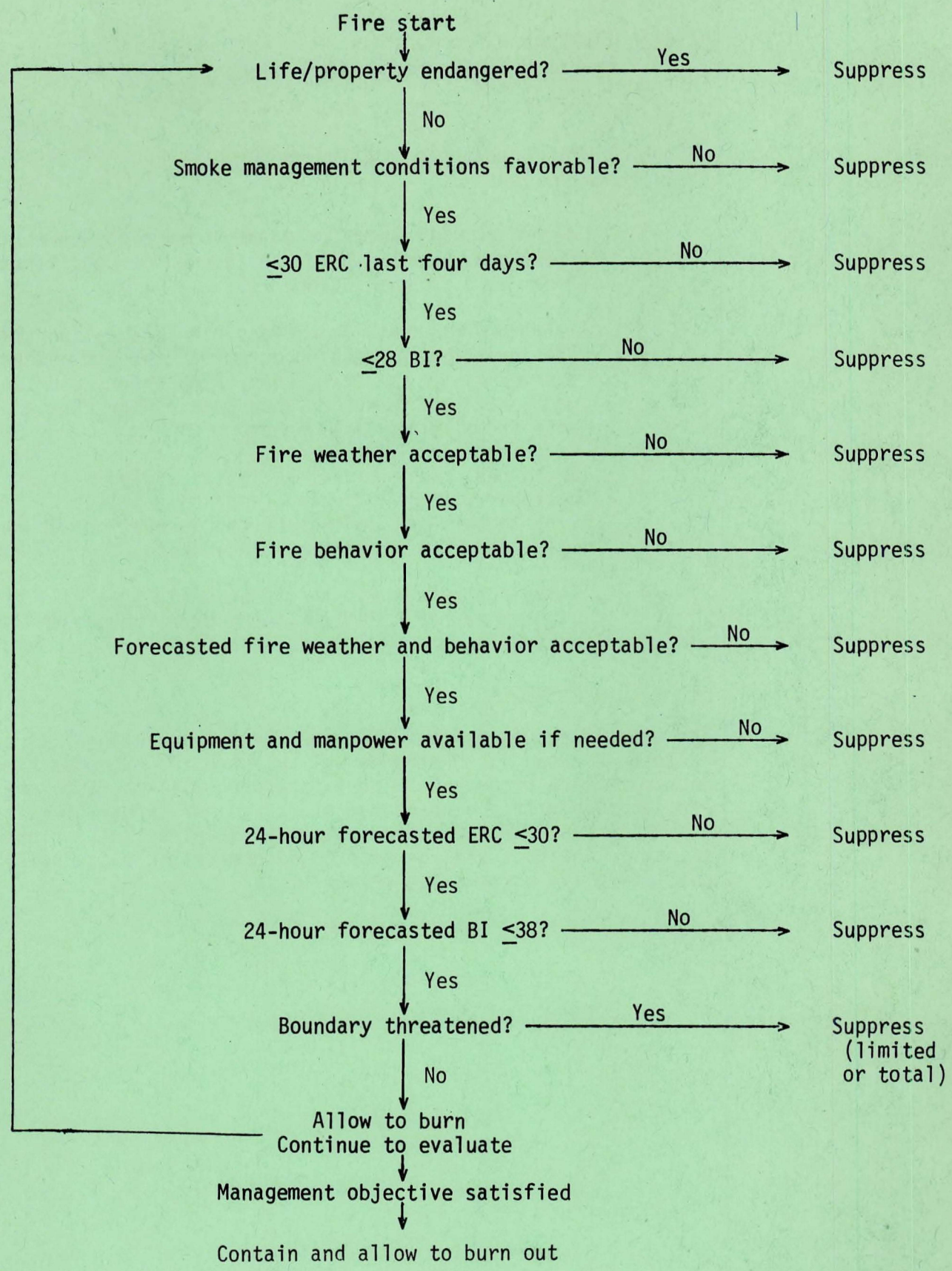
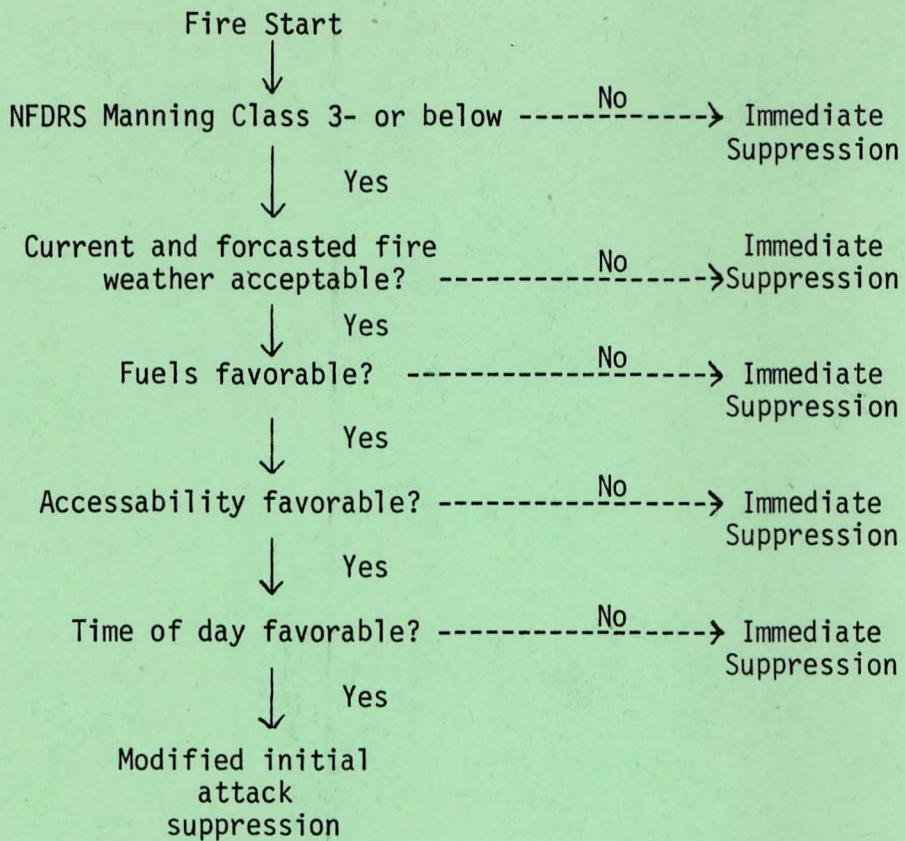


Figure 12

Decision flow chart for modified attack fires in the operational fire management areas



IX. OBSERVATION FIRE MANAGEMENT AREAS

A. Definition

Observation fire management areas are lands which are managed for primitive recreation, wildlife habitat, viewing, and natural vegetation diversity as directed by the land use plans. These areas have been withdrawn from timber entry. Typically they are high elevation areas where fuels are sparse and scattered. The overstory, when present, is open-grown, so shrub, herb, and grass communities constitute much of the vegetative cover. Fire danger is usually low because of natural barriers, especially rock landform. There are six fire management areas in this category.

Unplanned ignitions, both man-caused and lightning-caused, will be allowed to burn when they achieve desired results. It is expected that observation areas will have the most management fire activity because of the frequency of lightning fires. Unwanted fires will be suppressed.

Observation areas comprise much of the grizzly habitat on the District (appendix H). A major consideration of allowing fires in these areas is that fire-maintained food species are very important in the grizzly diet.

B. Cabinet Slopes Area

1. Description

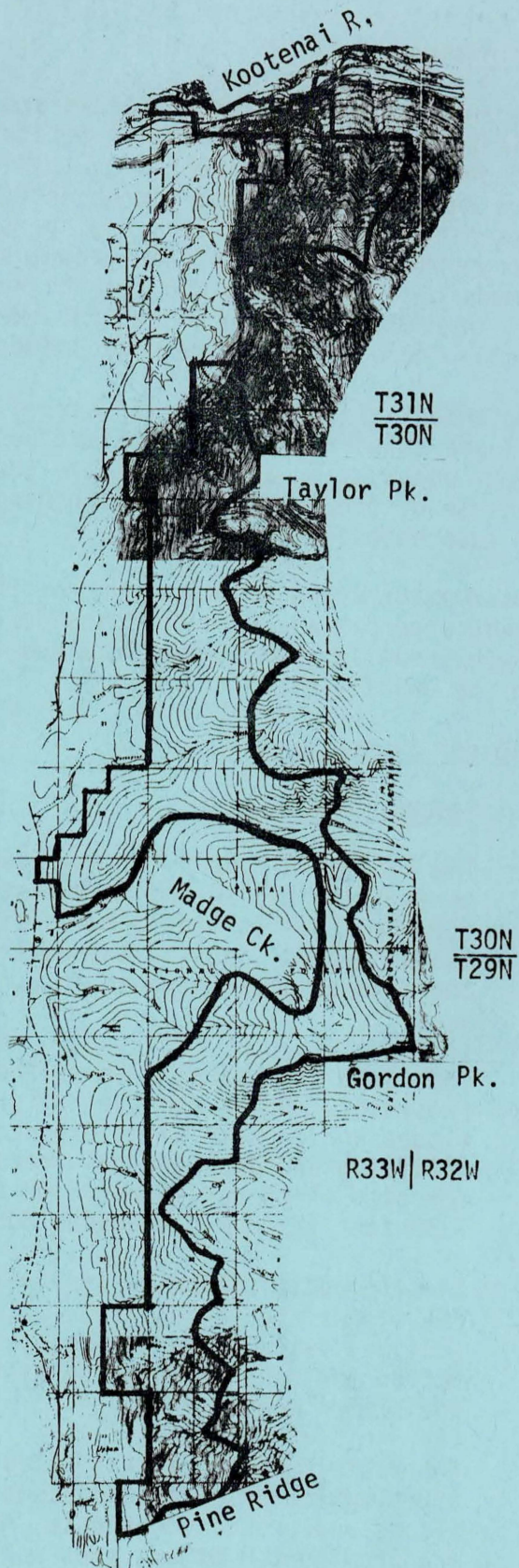
The Cabinet Slopes fire management area encompasses 15,281 acres (6188 ha) in the southeastern portion of the District (figure 12). It lies between the Cabinet Mountains Wilderness and protected lands in the Bull Lake Valley. The Madge Creek operational area intrudes into the middle of the Cabinet Slopes area.

This area dramatically shows the effects of the landforming processes. Soils are typically shallow on the steep, scoured slopes and on some sites exposed bedrock predominates. Block uplifting and dropping have resulted in sharp elevational differences which range from 2500 feet (763 m) at Madge Creek to 7395 feet (2255 m) at Gordon Mountain.

Annual precipitation varies greatly. About 35 inches (89 cm) falls near the valley floor while a maximum of about 100 inches (254 cm) falls on Gordon Mountain. Over half of this precipitation may be snow which persists on the mountain peaks into the summer months.

The most abundant habitat types are TSHE/CLUN and PSME/PHMA h.t.s, which often are adjacent to each other. On the higher slopes and protected aspects, ABLA/XETE and ABLA/MEFE h.t.s are prominent. Other types worth noting are PSME/LIBO, ABLA/CLUN, ABLA/LUHI, PSME/AGSP, and PSME/CARU h.t.s. Scree and rock are also common. Seral species which are most abundant are Douglas-fir, larch, ponderosa, lodgepole, and white pine which have been

Figure 12
Cabinet Slopes observation fire management
area.



perpetuated by past fires. Only about 25 percent of the forested area has stands of trees over 120 years old. These primarily occur in ravines and bottom lands and on protected slopes which have escaped severe fires. Cedar, hemlock, spruce, and sub-alpine fir are generally most abundant on these sites. At higher elevations near ridgetops, open stands of alpine larch and white-bark pine occur. Throughout the area forest cover is continuous except on rocky landforms. A wide variety of undergrowth species occur from the moist valley bottom to the exposed ridge line.

The primary uses of this area are viewing, hunting, access to the wilderness, and skiing. The area is unavailable for timber management and it is currently an inventoried roadless area (#174). Suitable wildlife habitat exists throughout.

2. Fire Occurrence

Fire records from 1940 to 1978 show 23 fires have been suppressed in the area which is an average fire frequency of one fire every two years. Eighteen fires were started by lightning, and five were man-caused. Most were small area burns because 19 were contained to Class A and four to Class B.

The Cabinet Slopes area is relatively dry because of its general westerly exposure, so large fires are not uncommon. Large area fires occurred in 1910, 1923, 1926, 1929, 1936, and 1942.

3. Fuels

Fuels are represented by Model G. However, Model H would be more suitable where trees are open-grown and fuel loadings are light. Total fuel loadings range from 3 to 30 t/a (7 to 67 t/ha) on south slopes and from 5 to 40 t/a (11 to 90 t/ha) on north slopes.

C. Sawtooth Mountain Area

1. Description

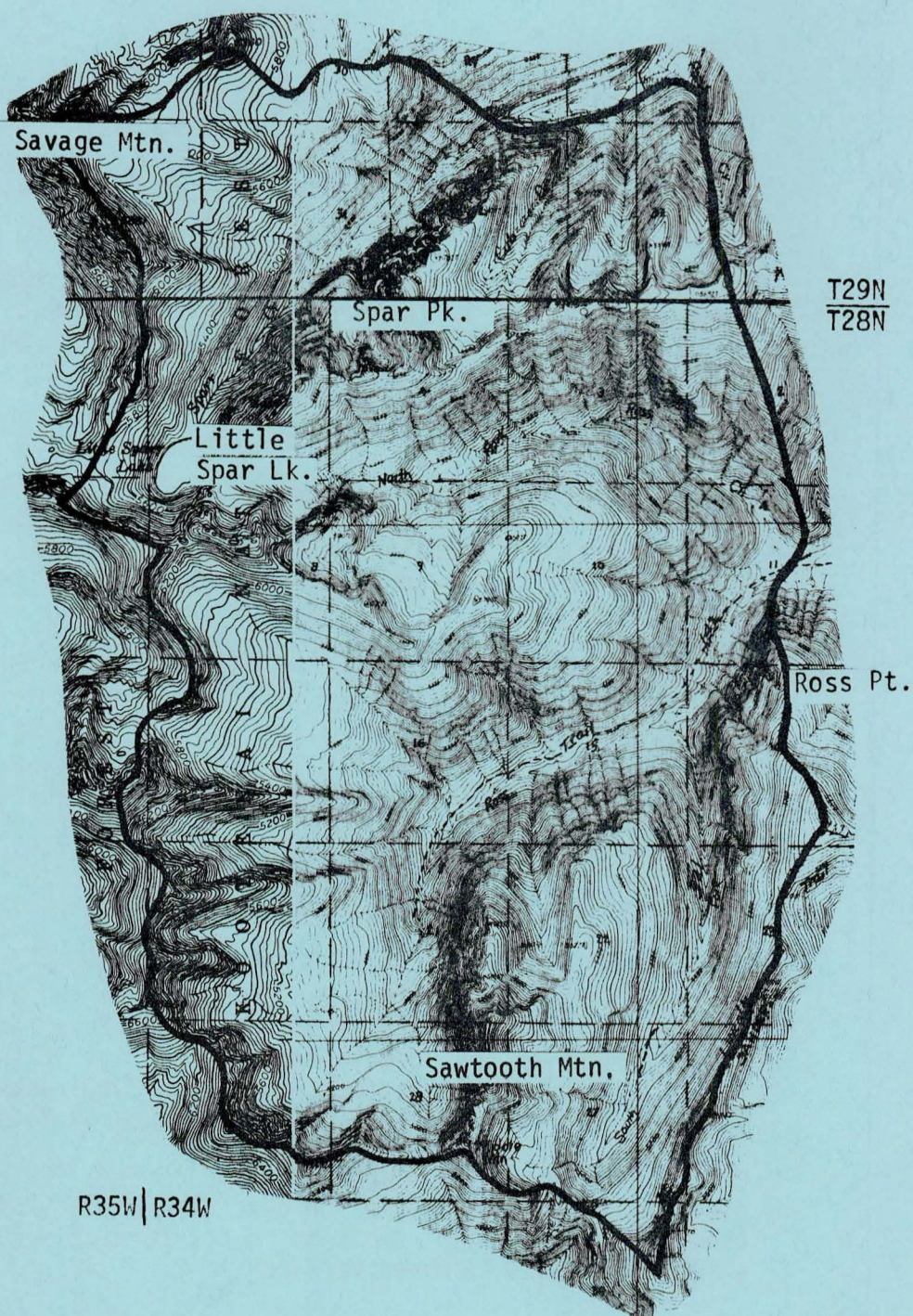
The Sawtooth Mountain fire management area covers 17,656 acres (7150 ha) in the extreme southwestern corner of the District (figure 13). The Spar Lake operational area lies to the southwest; the Cabinet District (Kootenai National Forest) is on the southern boundary; and the Idaho Panhandle National Forest forms the western boundary.

Alpine glaciation and block faulting created the sharp landform features such as cirque basins, hanging valleys, and craggy peaks. Overall, soil development is poor and often lacking on the rocky slopes. Elevations range from 3000 feet (915 m) below Ross Point to 6906 feet (2106 m) at Savage Mountain.

Precipitation annually ranges from 50 inches (127 cm) at the low elevations along Ross Creek to over 100 inches (254 cm) along the western ridgetops. Most is in the form of heavy snowfalls which occur from November to March.

Figure 13.
Sawtooth Mountain observation fire management
area.

(Pending congressional designation, this area
will become a portion of the Scotchman Peak
Wilderness Area.)



In this cold, moist area ABLA/LUHI, TSHE/CLUN, ABLA/CLUN, ABLA/XETE, and ABLA/MEFE h.t.s are most common. On the few dry aspects, PSME/LIBO and PSME/PHMA h.t.s are found. Rock constitutes most of the ridgetops and oversteepened slopes, so vegetation is sparse on these sites. Below the rocky ridges, whitebark pine grows in open stands, and spruce and subalpine fir occupy high basins often extending down-slope. White pine, lodgepole, larch, ponderosa, and Douglas-fir dominate the mountain slopes as the result of a fire which burned throughout most of the Ross Creek drainage about 1890. Cedar and hemlock grow best in the bottom lands. Undergrowth species vary distinctively with the habitat.

The area is primarily used for recreation: hunting, hiking, and camping. Some mining and trapping still occur. Wildlife habitat and watershed are very important resources in the Sawtooth Mountain area.

2. Fire Occurrence

Fire records from 1940 to 1978 show that 10 fires have been suppressed in the Sawtooth Mountain area which is an average of one every four years. Nine fires were Class A and one was Class B.

About 1890, a fire swept through the eastern portion of this area, primarily on the slopes, resulting in an even-aged stand of seral trees. The moist cedar grove on lower Ross Creek escaped the fire while the forests on the adjacent slopes were destroyed. On rocky sites, fire spread is restricted by sparse, discontinuous fuels.

3. Fuels

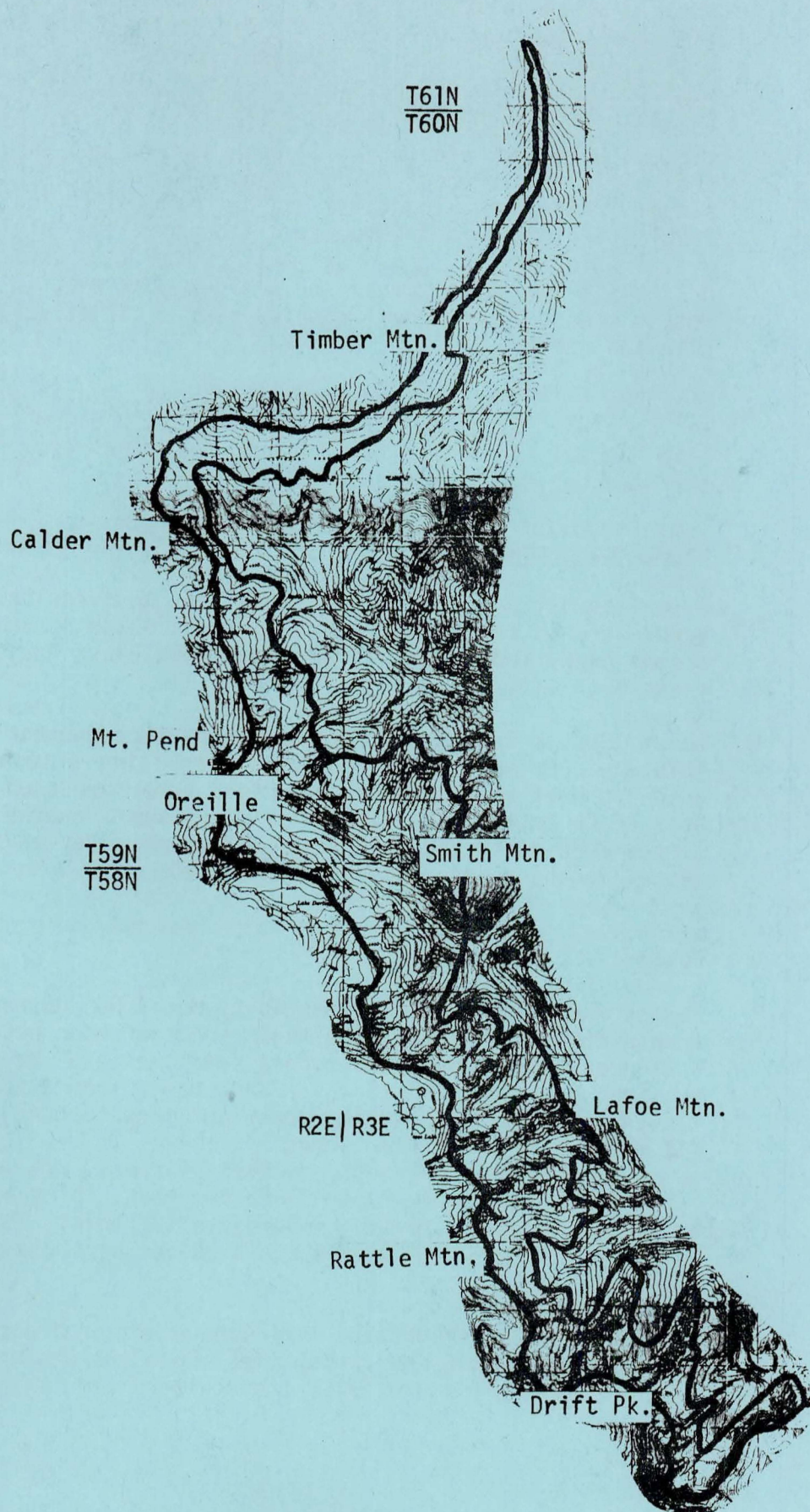
Forest fuels are best represented by Model G. On rocky mountaintops and ridges, the fuels are sparse or absent. Continuous rock slopes and ridges form a natural barrier to fire spread. Total fuel loadings range from 3 to 30 t/a (7 to 67 t/ha) on south slopes and from 5 to 40 t/a (11 to 90 t/ha) on north slopes.

D. Timber-Rattle Mountains Area

1. Description

The Timber-Rattle Mountains fire management area encompasses 25,824 acres (10,459 ha) which lies along the western boundary of the District (figure 14). Its southern end is in the Drift

Figure 14.
Timber-Rattle Mountains observation fire management
area.



Creek drainage near Spar Lake. The northern end is near the old mining town of Leonia not far south of the Kootenai River. The Idaho Panhandle National Forest forms the west boundary. On the east are the Spar Lake, Keeler Creek, Callahan Creek, and Star Creek operational areas.

Alpine glaciers created the cirque basins, hanging valleys, steep headwalls, aretes, lakes, and craggy peaks in the southern portion. The features become subdued in a northward direction where continental glaciation prevailed. Consequently, soil depth varies greatly throughout the area. Elevation ranges from 3200 feet (976 m) at the northern tip to 6785 feet (2069 m) at Mount Pend Oreille.

Annual precipitation is from 50 inches (127 cm) at the north end of the area to over 100 inches (254 cm) on the mountaintops to the south. Much of this is in the form of snow.

Rock landscape dominates the high elevations and over-steepened slopes, therefore, vegetation is scanty if present and consists of low growing undergrowth plants and scattered trees. Subalpine fir habitat types which occupy most of the timbered slopes are ABLA/CLUN, ABLA/XETE, ABLA/MEFE, and ABLA/LUHI h.t.s. PIAL/ABLA h.t. occurs throughout except in the southernmost portion. A small area of TSHE/CLUN h.t. is found in the Raymond Creek drainage, and PSME/PHMA h.t. occurs at the northern tip. Vegetation is very open grown at the high elevations. Subalpine fir predominates but spruce and whitebark pine are also present. On the lower slopes the seral species are most abundant: Douglas-fir, larch, white pine, lodgepole, and ponderosa. Cedar and hemlock grow in this area, but most abundantly on moist, protected sites. A variety of undergrowth plants associated with these habitat types are found.

Hiking skiing, hunting, and viewing are major uses of the Timber-Rattle Mountains area. Wildlife habitat and watershed are also important resources.

2. Fire Occurrence

Records from 1940 to 1978 show that 34 fires have been reported giving an average of one per year. Of these, one was man-caused and 33 were related to lightning. Most were small because 26 were Class A, seven were Class B, and only one was Class C.

Fires are typically small-area burns, but continuous, even-aged stands of seral trees are evidence that stand-destroying fires occurred in the past centuries. Rocky topography and discontinuous fuels in the southern portion of this area minimize fire spread.

3. Fuels

Continuous forest fuels are best represented by Fuel Model G. Sites which have been logged fit Model K. At high elevations, fuels become very sparse consisting of scattered trees and low vegetation. Continuous rock slopes and ridges form a natural barrier to fire spread in much of the area. The total fuel loadings range from 3 to 30 t/a (7 to 67 t/ha) on south slopes and from 5 to 40 t/a (11 to 90 t/ha) on north slopes.

E. Pulpit Mountain Area

1. Description

The Pulpit Mountain fire management area is in the northeast portion of the District within the O'Brien Creek operational area (figure 15). It entails about 1477 acres (598 ha).

Continental glaciation formed long, uniform slopes around the mountaintop, but alpine glaciers formed the steep slopes of the highest points. Soil depth varies considerably. Elevation ranges from 4800 feet (1464 m) at the south end to 6556 feet (2000 m) at the top of Pulpit Mountain.

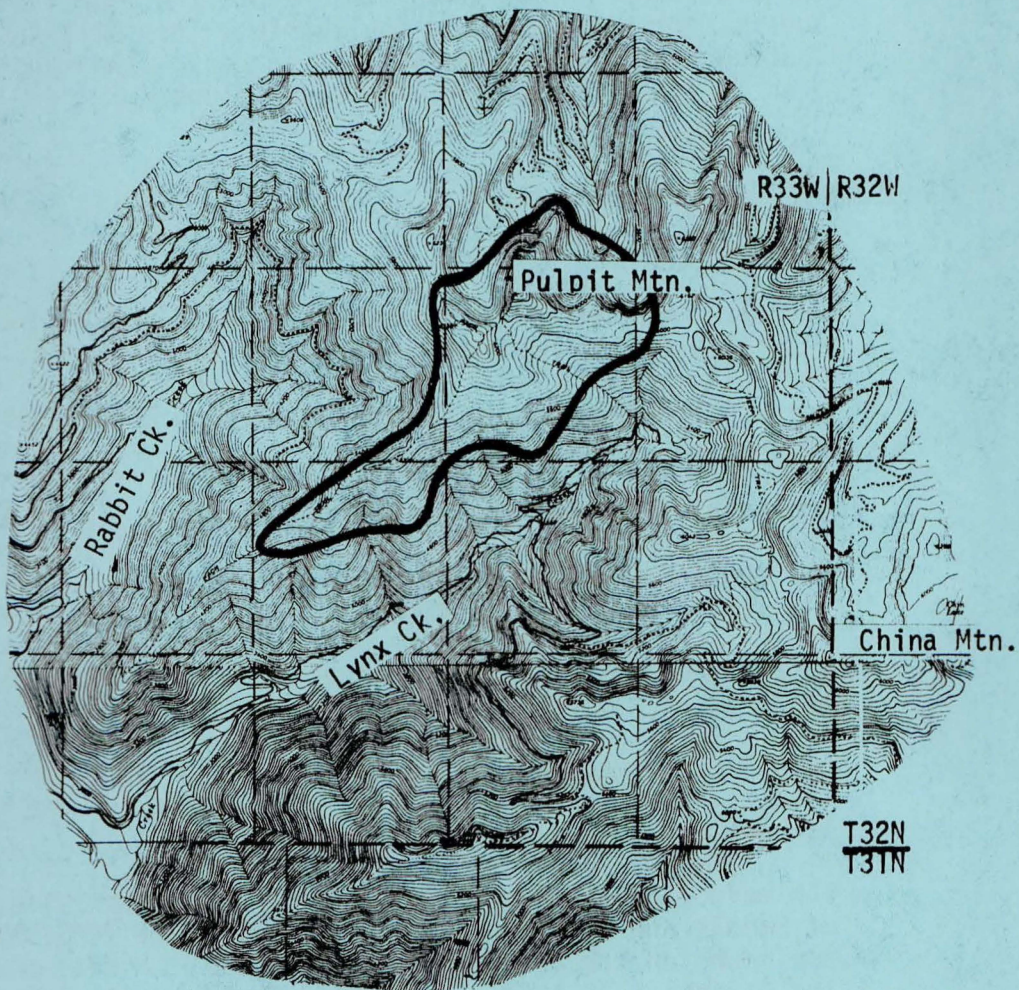
Precipitation annually varies over the area from 55 inches (140 cm) to 70 inches (178 cm) at the top of the mountain. Snowfall accounts for most of the precipitation, but it usually melts by May on exposed slopes.

ABLA/XETE h.t. is the most prominent and covers the highest elevations. Other types are ABLA/CLUN, ABLA/MEFE, and ABLA/LUHI h.t.s. which appear on protected slopes. Drier south-facing slopes are PSME/CARU and PSME/PHMA h.t.s., which are characterized by open forests with grass or shrub undergrowth. Subalpine fir and spruce are quite abundant. Douglas-fir, lodgepole, and larch occur throughout the area primarily at lower elevations and often in continuous stands. Common undergrowth species are found in this area.

The Pulpit Mountain area provides dispersed recreation opportunities for hunting, hiking, camping, and skiing. Wildlife habitat, watershed, and viewing are other resources.

Figure 15.

Pulpit Mountain observation fire management area.



2. Fire Occurrence

Only two lightning fires have been reported from 1940 to 1978. One was Class A and the other Class B. Consequently, frequency is very low, about one fire every 20 years.

Fires are typically small, but past large fires which burned forests on the lower slopes did spread into the area.

3. Fuels

Fuels are best represented by Fuel Model G where the forest is continuous. On exposed aspects the overstory decreases, and grass and shrub communities become the main fuel so Models C or H may be more applicable. The total fuel loading ranges from 5 to 40 t/a (11 to 90 t/ha) and from 3 to 30 t/a (7 to 67 t/ha) on south slopes.

F. Arbo Mountain Area

1. Description

The Arbo Mountain fire management area covers 2411 acres (976 ha) in the northeast section of the District (figure 16). The eastern boundary is the Yaak District (Kootenai National Forest) and the western boundary is the O'Brien Creek operational area.

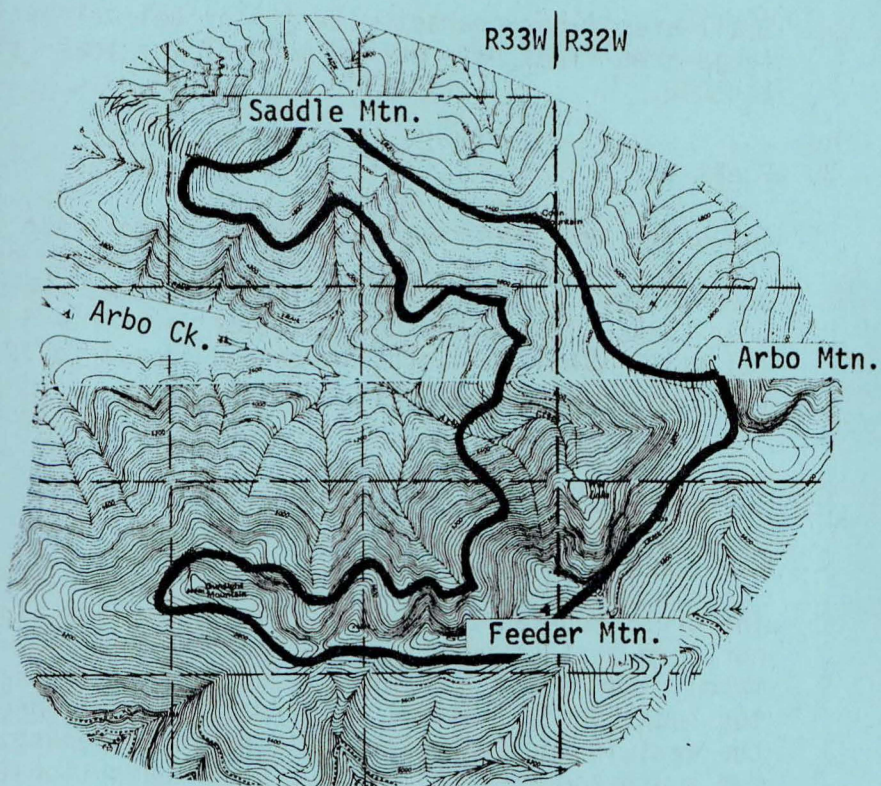
Continental glaciation formed long, uniform slopes around the mountaintops, but the sharp topographical features of the mountaintops and ridge lines have been carved by alpine glaciers. Much of the land has been extensively scoured, so soil depth varies considerably. Elevation ranges from 4200 feet (1281 m) at the head of Arbo Creek to 6350 feet (1937 m) at the peak south of Wee Lake.

Annual precipitation varies from 55 inches (140 cm) to 75 inches (191 cm) on the mountain peaks. Much of this appears as snow.

The main habitat type is PSME/AGSP h.t. on the exposed slopes of Saddle and Conn Mountains. PSME/ARUV and PSME/PHMA h.t.s. are found on the lower slopes, and ABGR/CLUN h.t. occurs in the ravines. On Arbo, Feeder, and Gunsight Mountains ABLA/MEFE h.t. is most abundant, followed by ABLA/XETE and ABLA/LUHI h.t.s. Subalpine fir, spruce, cedar, hemlock, and

Figure 16.

Arbo Mountain observation fire management area.



grand fir are prominent at the highest elevations, on protected aspects, and in ravines. On the drier slopes by Conn and Saddle Mountains, Douglas-fir, lodgepole, and larch are abundant because historic fires have promoted these trees. Often small stands will be dominated by one species. The undergrowth includes species typical of these habitat types.

The Arbo Mountain area provides dispersed recreation opportunities for hunting, hiking, fishing, camping, and skiing. Other resources are watershed, wildlife habitat, and viewing.

2. Fire Occurrence

From 1940 to 1978 in the Arbo Mountain area there has been one Class A fire started by lightning. Frequency is very low at an average of one fire in 40 years.

Small-area fires characterize the highest elevations, but large-area fires have burned much of the lower slopes prior to 1940.

3. Fuels

Fuels are best represented by Model G where the forest is continuous. The overstory component decreases on the mountaintops so grass and shrub communities become the main fuel. The total fuel loadings vary from 5 to 40 t/a (11 to 90 t/ha) on north slopes and from 3 to 30 t/a (7 to 67 t/ha) on south slopes.

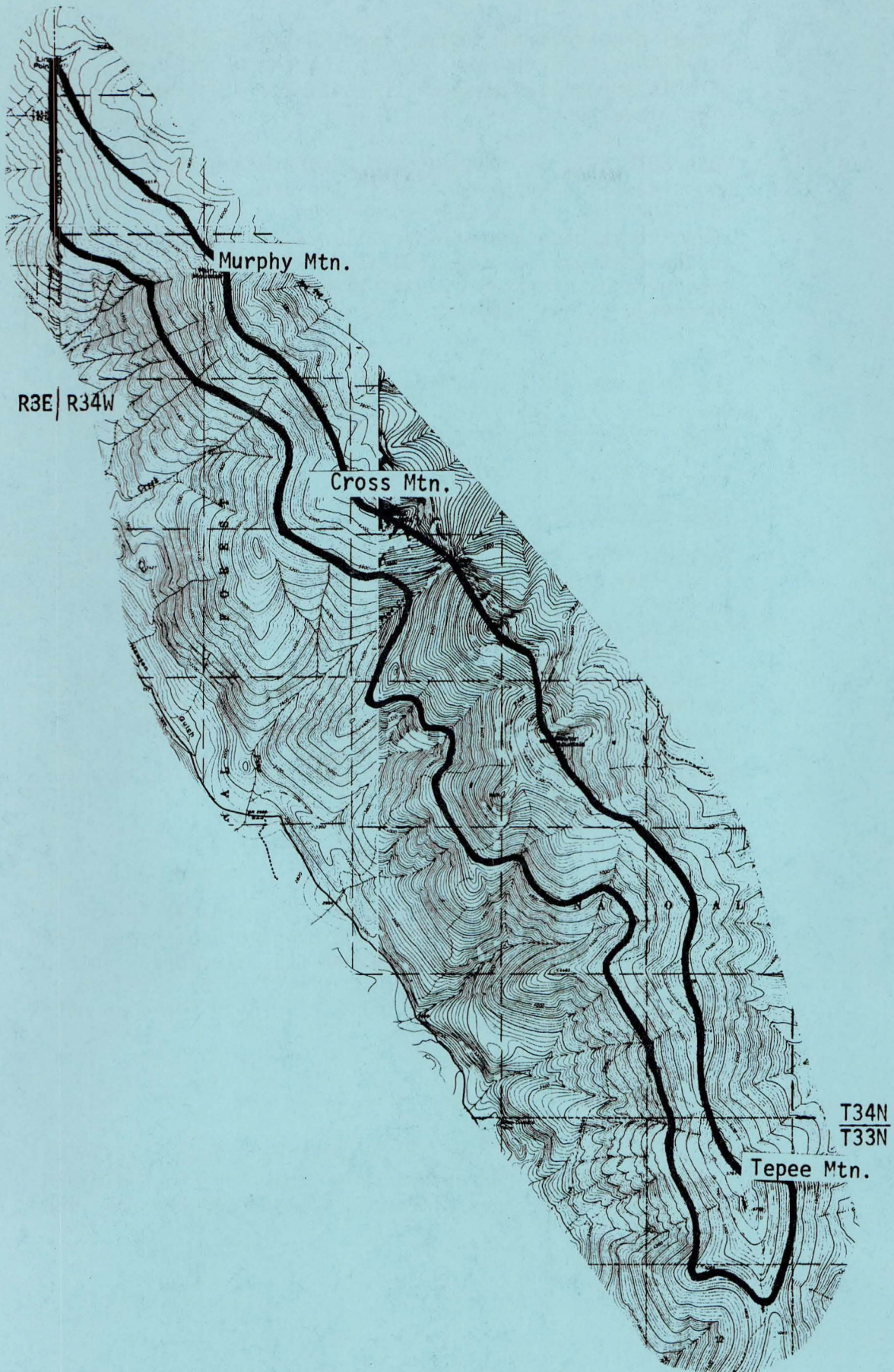
G. Cross Mountain Area

1. Description

The Cross Mountain fire management area lies along the northern-most boundary of the District and contains approximately 3968 acres (1608 ha) (figure 17). To the north is the Yaak Ranger District (Kootenai National Forest). On the west is the Idaho Panhandle National Forest, and to the south and east is the Pine Creek operational area.

Continental glacier action created long, uniform slopes, while alpine glaciers resulted in sharp features at the high elevations. Water erosion has created deep incisions on the steep, southwest-facing slopes. Elevation ranges from 4600 feet (1403 m) on the slopes to 6689 feet (2040 m) at Cross Mountain.

Figure 17.
Cross Mountain observation fire management area.



Annual precipitation ranges from 60 inches (152 cm) at low elevations to 85 inches (216 cm) on the mountaintops. Much of this appears as snow which lasts until mid-summer in the high elevations.

ABLA/XETE h.t. is abundant and occurs along the mountaintops and ridges. A small portion of the area contains PSME/PHMA and TSHE/CLUN h.t.s. and exposed rock. Subalpine fir is abundant at high elevations while cedar and hemlock grow in the ravines. On the slopes, Douglas-fir and lodgepole predominate, prompted by past fires. Often stands will be dominated by one species. Undergrowth plants are typical of the habitats.

The Cross Mountain area provides dispersed recreation opportunities for hiking, hunting, viewing, and camping. Other resources include watershed and wildlife habitat.

2. Fire Occurrence

Records from 1940 to 1978 show that only ten lightning fires have been reported in the Cross Mountain area with an average frequency of one every four years. Six were Class A, three were Class B, and one was Class C.

Fires are typically small-area burns at high elevations. Continuous, even-aged stands of seral trees on the lower slopes are evidence of stand-destroying fires, the main one occurring about 1850. Fire effects are less severe on the slopes where stands are open-grown and fuels are low.

3. Fuels

Fuels are best represented by Model G where the forest is continuous. On exposed sites the overstory decreases, and grass and shrub communities become the main fuel. Total fuel loadings range from 3 to 30 t/a (7 to 67 t/ha) on south slopes and from 5 to 40 t/a (11 to 90 t/ha) on north slopes.

H. Fire Prescription

Because of variation in fuel and vegetative situations, location, and natural barriers, the observation areas have been divided into two groups which have different seasons and prescription

guidelines for management fires. The difference between post-season low and high has been explained in Section VI, Part A.

<u>Preseason</u> <u>Post-season (low)</u>	<u>Preseason</u> <u>Regular season</u> <u>Post-season (high)</u>
Cabinet Slopes Area Pulpit Mountain Area Arbo Mountain Area	Sawtooth Mountain Area Timber-Rattle Mountains Area Cross Mountain Area

In the Cabinet Slopes, Pulpit Mountain, and Arbo Mountain areas, management fires may burn during the preseason (before June 1) and the post-season (after September 15), using the low elevation criteria for the latter. These areas were not included in the regular season because the combination of oversteepened slopes and continuous fuels poses serious containment problems on Manning Class 3-plus days or above (high fire danger). The decision flow charts are shown in figures 18 and 20. These prescription criteria will be reviewed at least daily when a management fire is burning.

In the Sawtooth Mountain, Timber-Rattle Mountains, and Cross Mountain areas, management fires could burn throughout the fire season. Preseason is before June 1, regular season is from June 1 to September 15, and post-season is after September 15. The high elevation prescription criteria will be used during the post-season. The decision flow charts are in figures 18, 19, and 21. The will be reviewed at least daily when a management fire occurs.

The objectives of allowing management fires in the observation areas are:

1. Return fire to the ecosystem recognizing that it is a natural agent contributing to the landscape.
2. Maintain diverse plant communities for primitive recreation, viewing, and wildlife habitat.

Figure 18

Decision flow chart for preseason (before June 1) fires
in the observation fire management areas

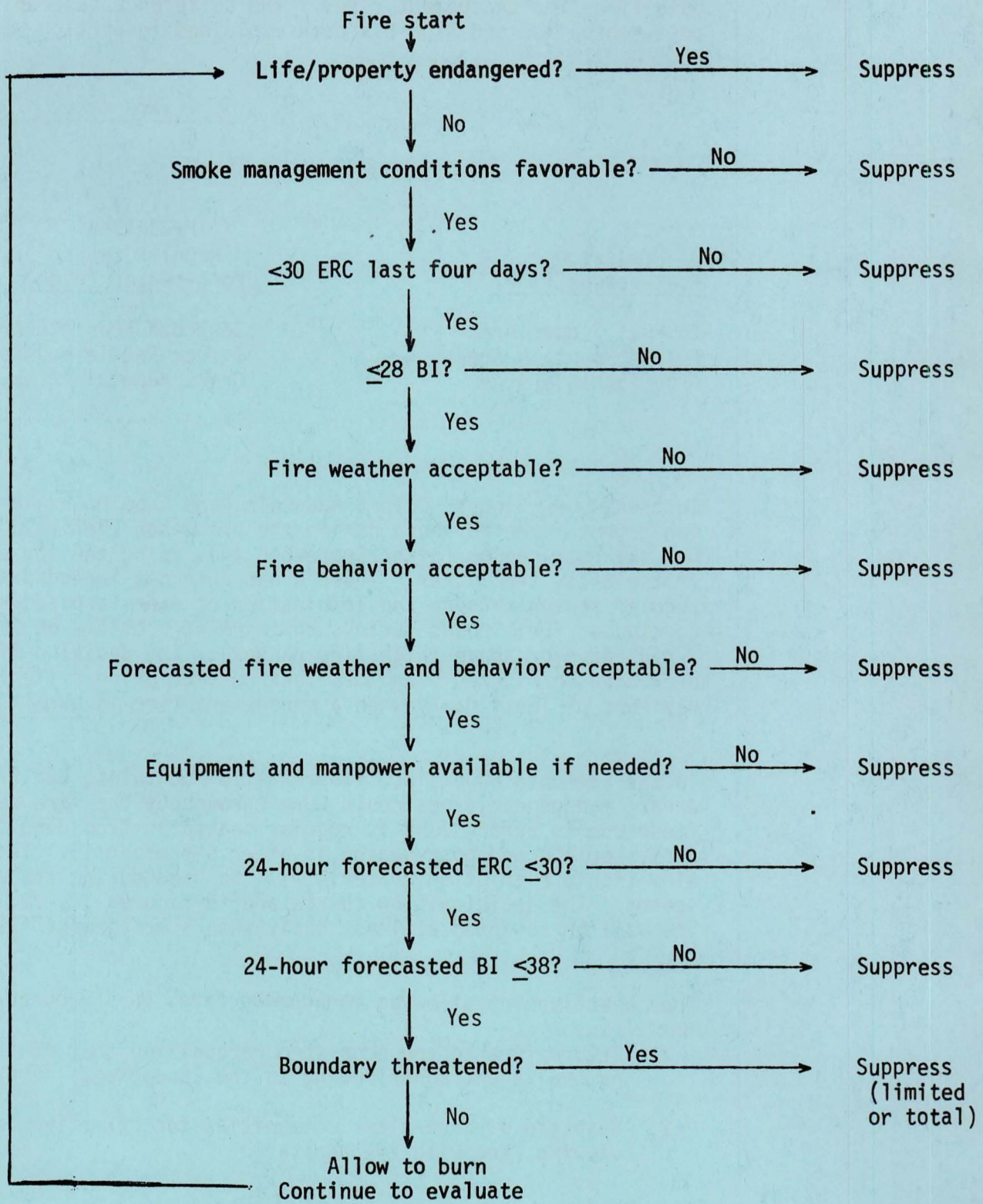


Figure 19

Decision flow chart for regular season (June 1-September 15)
fires in the observation fire management areas

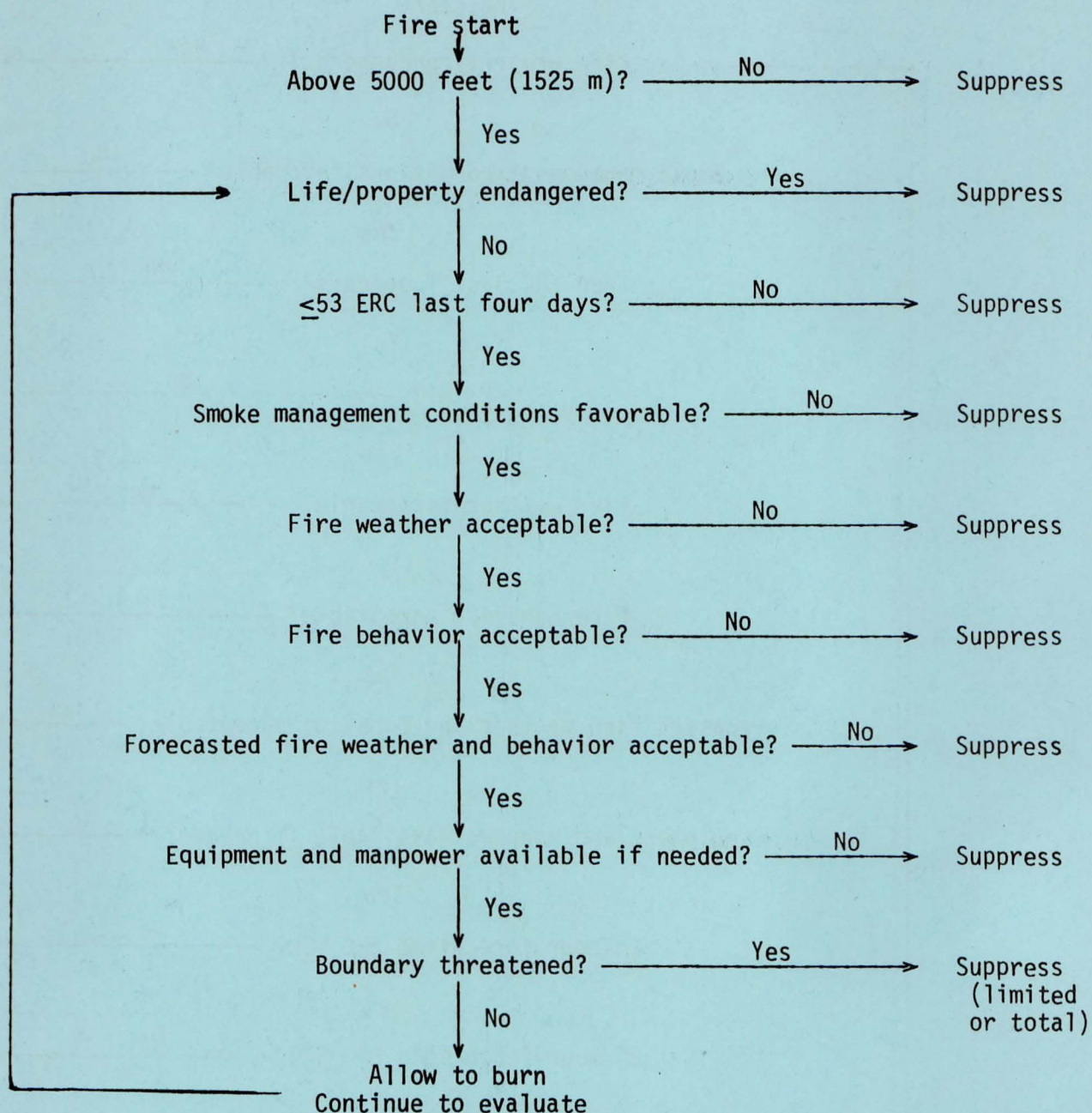


Figure 20

Decision flow chart for post-season (after September 15)
fires in the low elevation observation fire management areas

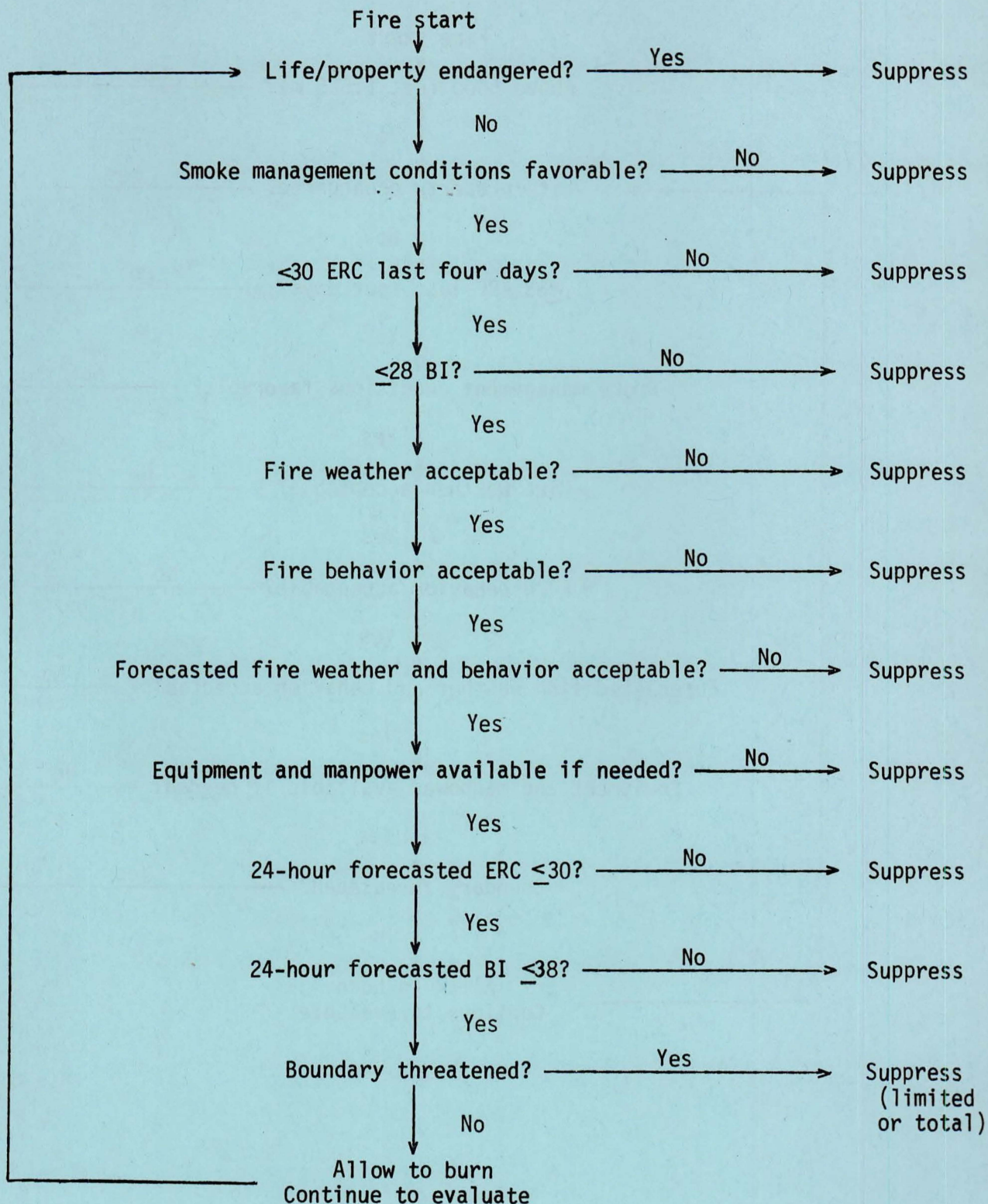
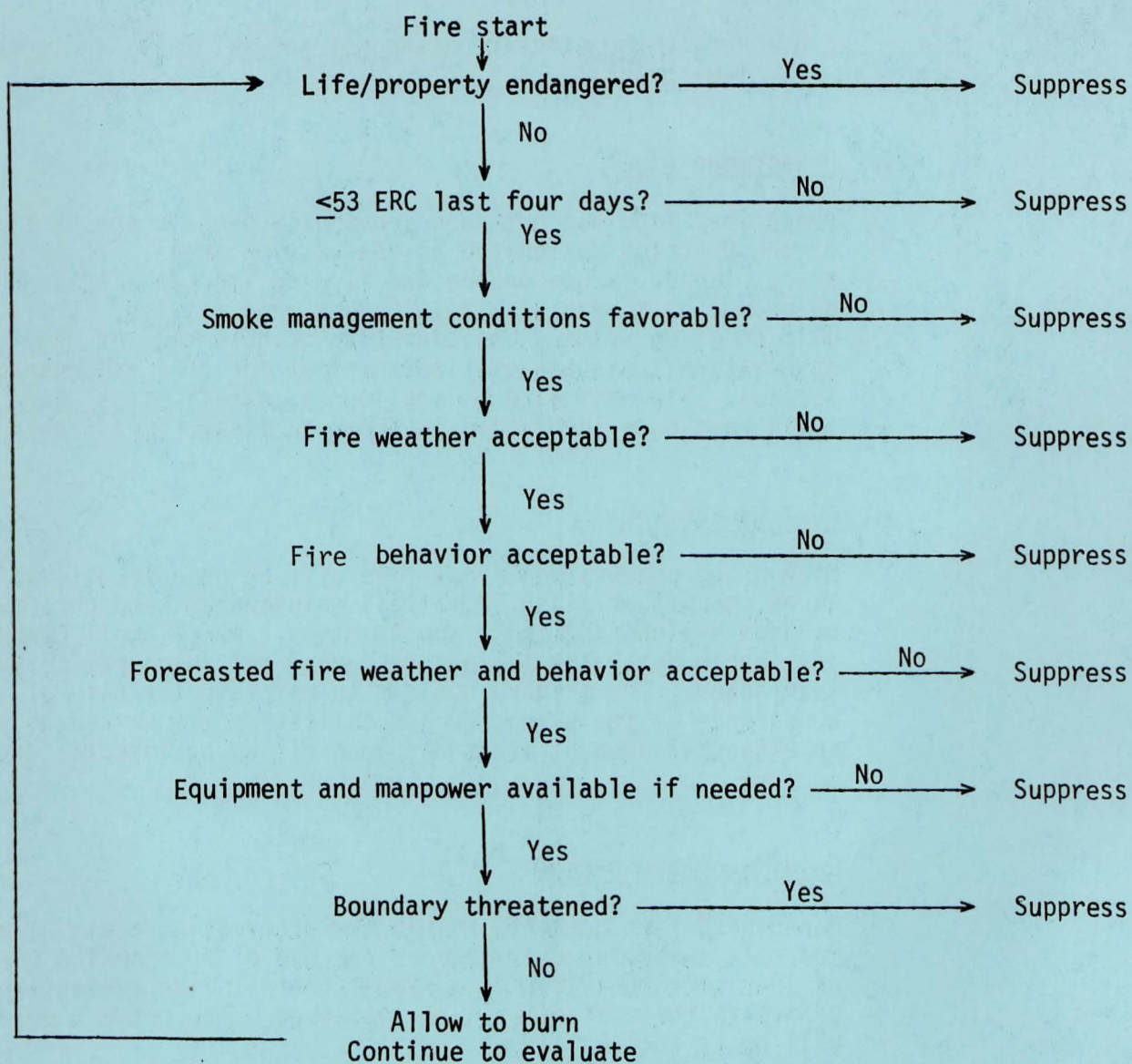


Figure 21

Decision flow chart for post-season (after September 15)
fires in the high elevation observation fire management areas



3. Improve grizzly bear habitat by promoting preferred food species with fire.
4. Reduce suppression costs by allowing certain fires to burn.
5. Reduce the wildfire hazard of natural fuels and create fuel breaks.

I. Prescribed Fire

Prescribed fire has not been previously used in the sections of the District designated as observation areas. It is now being planned to use prescribed fire to improve wildlife habitat by promoting forage availability and productivity. Grizzlies will be given primary consideration because many of the observation areas are critical habitat for this endangered species. Fire may also be applied to certain sites where hazardous fuels have been identified in order to create fuel breaks.

J. Fuel Management

Within the observation areas fire will be used to dispose of large amounts of slash from trail maintenance and construction or from helispot/heliport construction. Where small amounts are involved, slash will not be burned but inconspicuously rearranged. The primary goal is to maintain the natural appearance of the site. Fuel modification may be needed where an extensive area of trees has been killed by insects, diseases, or fire.

K. Wildfire Prevention

Man-caused fire activity within the observation areas have been minimal, numbering only seven fires out of 80 from the period of 1940 through 1978. As a result the wildfire prevention effort in these areas will be low-keyed. The primary objectives will be as follows:

1. Wildfire prevention messages and/or posters will be located at the beginning of all trails entering the observation areas.
2. Information about each observation fire management area and the Troy Fire Plan, as well as wildfire prevention messages, will be included in the Troy Recreation Opportunity Guide for public distribution.
3. Contact by the Recreation Technician and Fire Prevention Specialist with recreationists will emphasize wildfire prevention.

L. Wildfire Suppression

The goal for wildfire suppression is to provide well planned and executed fire protection and fire use programs. Fire suppression will be fast, energetic, and thorough with a high degree of regard for personal safety, property, and resources. If a wildfire escapes initial attack, an escaped fire situation analysis will be made to determine the most logical, cost-effective suppression.

Fire suppression measures and techniques will be used that are compatible with objectives for managing the natural state of these areas as directed by the Kootenai National Forest Land Use Plans. The following guidelines will be used.

1. Fire suppression structures and developments shall, when feasible, be located outside of these areas.
2. Preference shall be given to methods and equipment which least alter the landscape or disturb the land. Heavy equipment will not be used except by approval of the Forest Supervisor.
3. Fire suppression activities will strive for minimal damage to resources, not felling all snags, minimum width for firelines, etc. Sites that have been significantly damaged will be rehabilitated.

X. WILDERNESS FIRE MANAGEMENT AREA

A. Definition

The 1964 Wilderness Act states that a wilderness be "...managed so as to preserve its natural conditions ... generally appears to have been affected primarily by the forces of nature ...". Land management plans for the Cabinet Mountains Wilderness support the development of a functional fire management plan to return fire to the ecosystem. There is one fire management area in this category.

Lightning fires will be allowed to burn when they are achieving desired results. At this time, man-caused fires will be suppressed according to current Forest Service policy as interpreted from the Wilderness Act. Unwanted fires will be suppressed.

This area is critical grizzly habitat (appendix I). A primary consideration of allowing fires in the wilderness is to promote fire-maintained food species that are important to the grizzly diet.

A fire management plan is being prepared for the entire wilderness, which comprises three Districts on the Kootenai National Forest. This section presents the information and planning for that portion which is on the Troy Ranger District.

B. Description

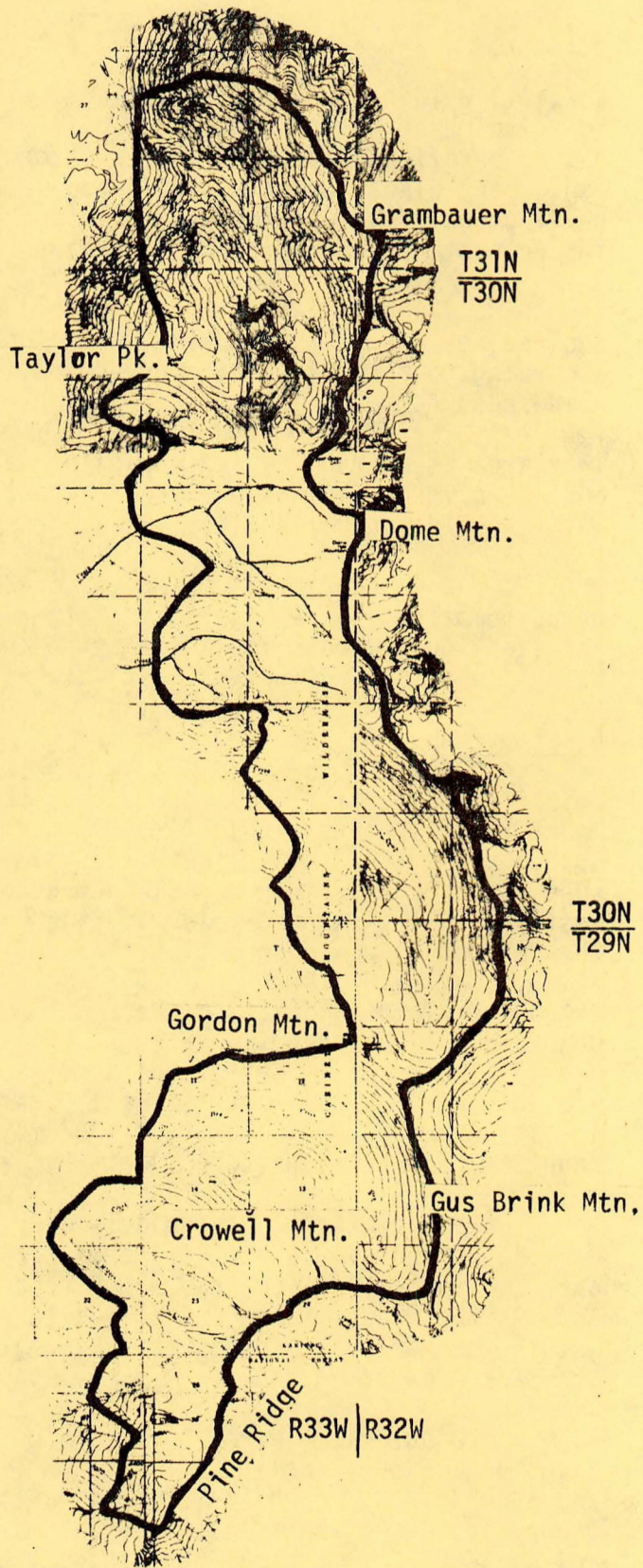
This fire management area consists of the portion of the Cabinet Mountains Wilderness in the Troy Ranger District which is roughly 15,365 acres (6223 ha) (figure 22). The portions of the wilderness supervised by the Libby and Cabinet Ranger Districts are to the east and south, respectively. On the north and west boundaries are the Cabinet Slopes observation area and protected lands.

Extensive alpine glaciation created the cirque basins, sharp ridges, U-shaped valleys, hanging valleys, and scoured sideslopes which are distinctive features of this wilderness. Except in valleys, soils are very shallow and rocky, usually less than one foot (30 cm) deep. Elevation ranges from 2500 feet (762 m) at the base of Grambauer Mountain to 7568 feet (2307 m) at the peak of Sugarloaf Mountain.

Annual precipitation varies widely over the area. At the base of Grambauer Mountain, 30 to 40 inches (76 to 102 cm) are common while over 100 inches (250 cm) have been recorded in the high elevations. Snow is the predominant form of moisture and often persists throughout the summer months on north-facing aspects at alpine elevations. Snowpack exceeds 14 feet (4 m) in many places.

Rock and Douglas-fir scree h.t.s are prominent in high elevations. Forested areas primarily fall into the cold, moist ABLA/LUHI, ABLA/MEFE, and ABLA/XETE h.t.s while lesser amounts of ABLA/CLUN and PIAL-ABLA h.t.s occupy protected sites and ridges. Small areas of TSHE/CLUN, PSME/PHMA and ABGR/XETE h.t.s occur throughout the wilderness. At elevations below

Figure 22
Cabinet Mountains Wilderness fire management area.



5000 feet (1552m), plant life is quite varied primarily because of the relatively moderate weather. In this zone subalpine fir, spruce larch, cedar, hemlock, white pine, Douglas-fir, and lodgepole are common. The high elevations are typical subalpine and alpine zones. The primary conifers in the subalpine zone (roughly 5000 to 6500 feet) (1552 to 1981 m) are spruce, subalpine fir, whitebark pine, and alpine larch. Alpine vegetation is sparse on the rock landforms consisting of hardy forbs, grasses, and occasional trees and shrubs. The undergrowth species vary distinctly with increased elevation.

The Cabinet Mountains Wilderness has retained it's primitive recreation state because of rugged topography, high elevations, and limited accessibility. Primary interests in the Cabinets are recreational uses such as fishing, hiking, camping, and hunting. The esthetic value of the wilderness is very important for users and nonusers.

C. Fire Occurrence

Fire records from 1940 to 1978 show 14 fires have been suppressed which is an average frequency of one every three years. Nine of the fires were contained to a Class A, three to Class B, and one to Class C. Thirteen fires were started by lightning and one was man-caused.

Most fires are small-area burns restricted by sparse, discontinuous fuels. Portions of the wilderness were burned by large fires in 1910, 1923, 1936, and 1958.

D. Fuels

Continuous forest fuels are represented by Model G, possibly with Model H for open stands. Near the alpine zone, fuels become very sparse consisting of scattered downfall and low vegetation. There is no model for this fuel situation. Continuous rock slopes and ridges form a natural barrier to fire spread. Total fuel loadings range from 5 to 40 t/a (11 to 90 t/ha) on north slopes and from 3 to 15 t/a (7 to 34 t/ha) on south slopes.

E. Fire prescription

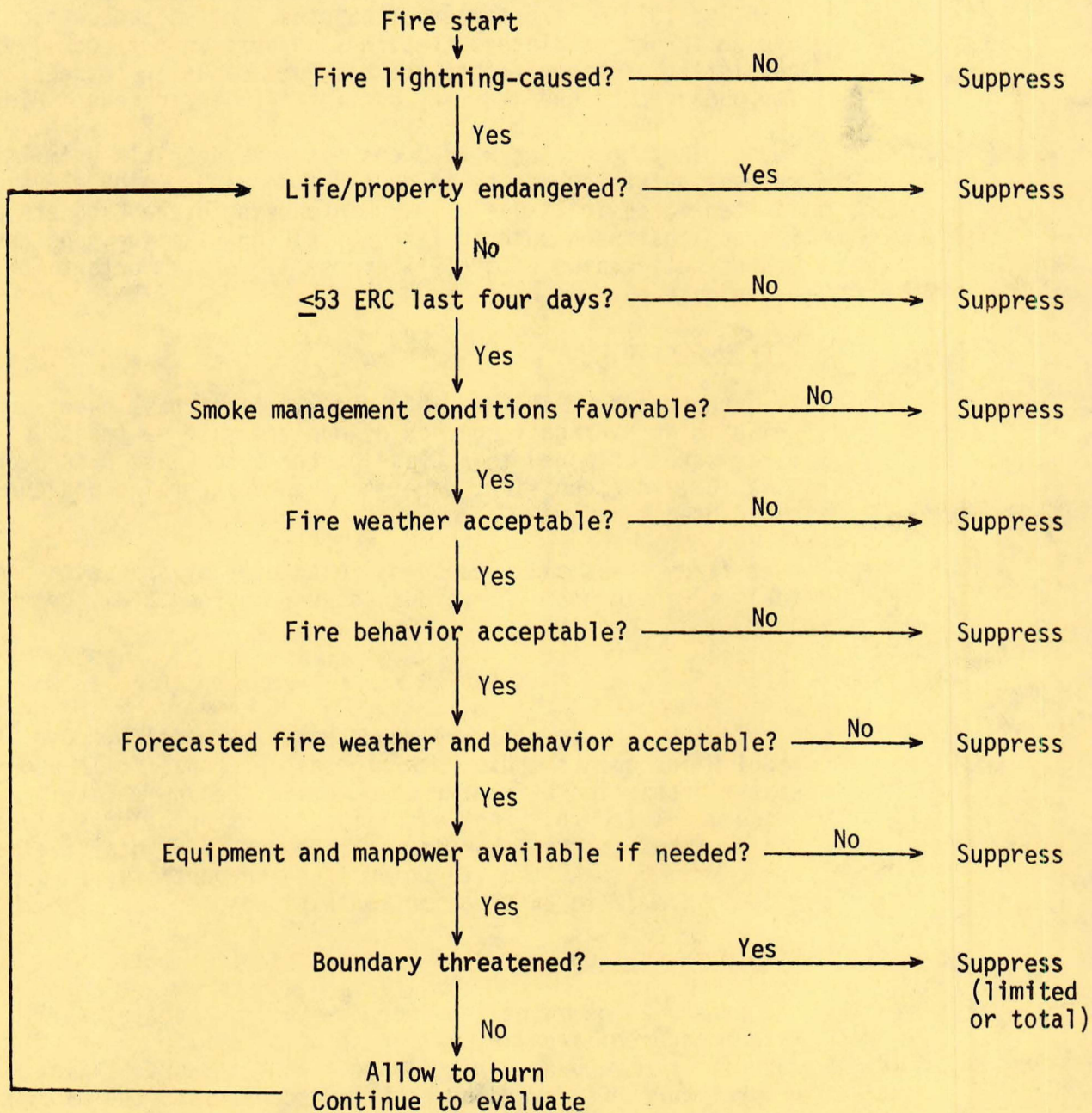
The prescription guidelines for the Cabinet Mountains Wilderness fire management area is written to allow a wide range of conditions when fires may burn. This is because of the overall low fuels, natural barriers formed by rock landscapes, and the management objective to maintain the character of the wilderness. The decision flow chart, which is shown in figure 23 will be reviewed daily when a management fire occurs.

The objective of allowing management fires in the wilderness is:

1. Return fire to the ecosystem recognizing that it is a natural force which contributes to the wilderness characteristic. This concurs with the emphasis of the Wilderness Act to preserve natural conditions.

Figure 23

Decision flow chart for fires in the wilderness fire management area



Secondary benefits derived are:

1. Maintain diverse vegetative communities for primitive recreation, viewing, and wildlife habitat.
2. Improve grizzly bear habitat by promoting preferred food species with fire (appendix I).
3. Reduce suppression costs by allowing certain fires to burn.
4. Reduce the wildfire hazard of natural fuels and create fuel breaks.

F. Prescribed Fire

Prescribed fire is currently not allowed in the wilderness because of Forest Service policy.

G. Fuel Management

Within the wilderness, slash resulting from trail maintenance and construction will be disposed of by scattering it in order to keep the natural appearance of the site.

H. Wildfire Prevention

Only one fire out of 14 has been caused by people during the period from 1940 to 1978. Consequently, the prevention effort will be low-keyed with the objectives as follows:

1. Wildfire prevention messages including information regarding management fires will be posted at established trailheads.
2. Prevention messages and information about the Troy Fire Plan relevant to the wilderness will be included in the Troy Recreation Opportunity Guide for public information.
3. Contact with recreationists by the Wilderness Guard and Fire Prevention Specialist will stress wildfire prevention.

I. Wildfire Suppression

The goal for wildfire suppression is to provide well planned and executed fire protection. Fire suppression will be fast, energetic, and thorough with a high degree of regard for personal safety, property, and resources. If a wildfire escapes initial attack, an escaped fire situation analysis will be made to determine the most logical, cost-effective suppression.

Fire suppression measures and techniques shall be used that are compatible with objectives for managing the Cabinet Mountains Wilderness as directed by Interim Cabinet Mountains Wilderness Fire Management Plan. The following guidelines will be used:

1. Fire suppression structures and developments shall, when feasible, be located outside the Wilderness.
2. Preference will be given to methods and equipment which least alter the landscape or disturb the land surface. Bulldozers or other heavy equipment will not be used, except by approval of the Forest Supervisor.
3. Aircraft, and other motorized equipment, i.e., chain-saws, pumps, generators, etc., may be used for fire suppression if deemed necessary for control purposes. This includes landing by helicopter when on-the-ground intelligence is necessary for making a suppression/no suppression decision within areas where fire is to assume a more natural role. The Forest Supervisor must authorize the use of motorized equipment (FSM 2326).
4. As soon as a fire is controlled and/or mopped up, all transport, additional suppression measures, and equipment movement will be consistent with wilderness objectives for maintaining natural conditions. However, aircraft may be used to move men and equipment to another fire emergency. All firelines, spike camps, etc., will be rehabilitated to maintain a natural appearance of the sites.
5. If movement of men or equipment from fires by primitive means will create an adverse impact on wilderness values, aircraft may be used for this purpose even though the emergency has ceased to exist. Example: The removal of equipment might require the cutting of an unwanted trail or the only trail location might be on a very steep grade where pack stock use would contribute to excessive erosion or other trail deterioration.

XI. SPECIAL FIRE MANAGEMENT AREAS

A. Definition

Special areas on the District have been set aside for recreational and educational uses and are managed as directed by the land use plans. There are eight fire management areas in this category, and they are the campgrounds, picnic areas, and scenic area located throughout the District.

Prescribed fire has been used to clean up excess debris and to burn slash created by logging of dangerous, damaged, and infected trees. Now unplanned fires, either man-caused or lightning-caused, will be allowed to burn when they are achieving desired results described in the objectives for management fires in this area. Only a few fires have occurred in the past 39 years, and it is not expected that many of the areas will be affected by unplanned ignitions. However, it is the intent of the Troy Fire Plan to take advantage of those fires which are beneficial. Unwanted fires will be suppressed.

Fires in special areas will be permitted in the spring and fall when tourist use is minimal, and each fire will be monitored continuously until it is out. A fire will be confined to a portion of the area because it is undesirable to have the entire area burn at one time. The Management Fire Committee will determine the maximum size of the fire at the time it is burning. Generally these fires will be suppressed by the end of the day.

B. Description

The special fire management areas are: Ross Creek Scenic Area, 100 acres (41 ha); Ross Creek Picnic Area, 20 acres (8 ha); Bad Medicine Campground, 38 acres (15 ha); Dorr Skeels Campground, 46 acres (19 ha); Spar Lake Campground, 20 acres (8 ha); Kilbrennan Lake Campground, 23 acres (9 ha); Yaak River Campground, 30 acres (12 ha); and Yaak Falls Campground, 20 acres (8 ha). These sites are by lakes or streams throughout the District (figures 24 and 25).

The major influence on these sites has been continental glaciation, and subsequent alluvial and lacustrine processes have created the flat-to-undulating topography seen today. Yaak River Campground has the lowest elevation of 1800 feet (549 m), and the range extends to 4400 feet (1341 m) at the Spar Lake Campground.

Annual precipitation varies for the widely spaced special areas. Campgrounds in the river valleys have 30 to 40 inches (76 to 102 cm) while the Ross Creek complex and Spar Lake Campground receive about 50 and 60 inches (127 and 152 cm), respectively.

Yaak Falls Campground, located in PSME/PHMA h.t., is the driest site. The wettest are THPL/OPHO h.t. at Dorr Skeels and THPL/CLUN h.t. at

Figure 24.

Special fire management areas in the northern half
of the District.

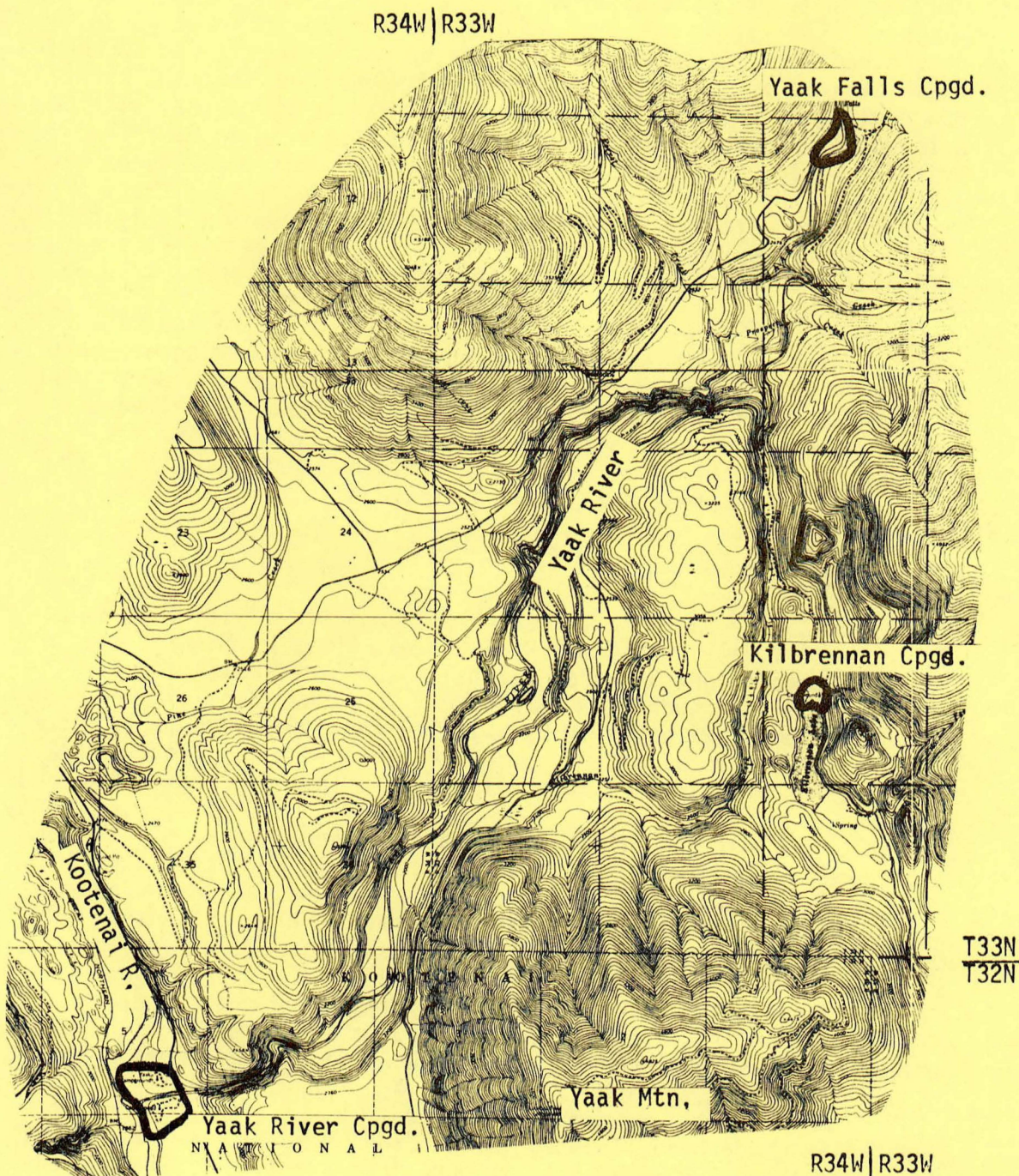
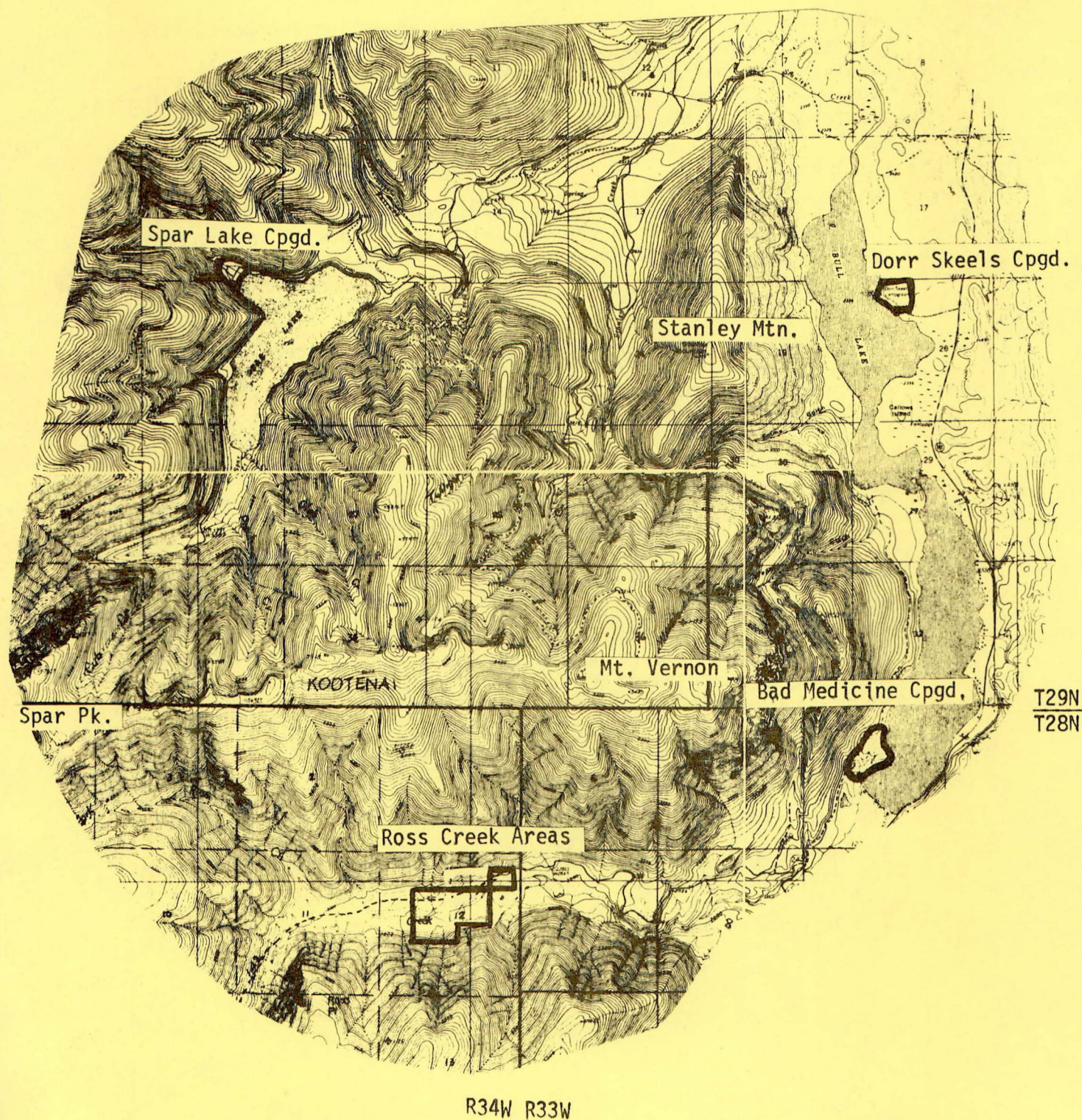


Figure 25.

Special fire management areas in the southern half of the District.



Ross Creek. The remaining areas are TSHE/CLUN h.t. Except at Ross Creek, the overstory is typically in the seral successional stages. Douglas-fir and larch are the dominant trees; the ponderosa, lodgepole, and white pine composition varies with the location.

Spruce may be locally abundant, especially in the Spar Lake area. Hemlock and cedar are present in varying amounts in seral stands but recurrent fires have kept them from achieving dominance. The passage of more than six hundred years without a stand-destroying fire has allowed the cedar grove along Ross Creek to reach the climax stage which makes this a unique area in the District since giant cedars dominate the area represented. A variety of associated undergrowth is found in the special fire management areas.

Special areas provide recreational and educational opportunities. The scenic area at Ross Creek is unique because it is the only western redcedar grove in Montana which has been developed for the public. Signs along the nature trail explain various ecological features of the grove.

C. Fire Occurrence

During the past 39 years (1940-1978), only seven man-caused fires have been suppressed in the special sites. This is an average of one every six years. Five occurred in the Yaak River Campground and two in the Bad Medicine Campground. All were contained to Class A size.

Many of the areas experienced stand-destroying fires between 1850 and 1910. Part of the Ross Creek Scenic Area was burned by a moderate ground fire around 1890. The same fire destroyed the forests on the surrounding slopes.

D. Fuels

Forest fuels are generally light in the special areas. Fuel Model H represents the fuel type. Total fuel loadings range from 1 to 25 t/a (2 to 56 t/ha) on all areas but Ross Creek where the loading is over 80 t/a (179 t/ha).

E. Fire Prescription

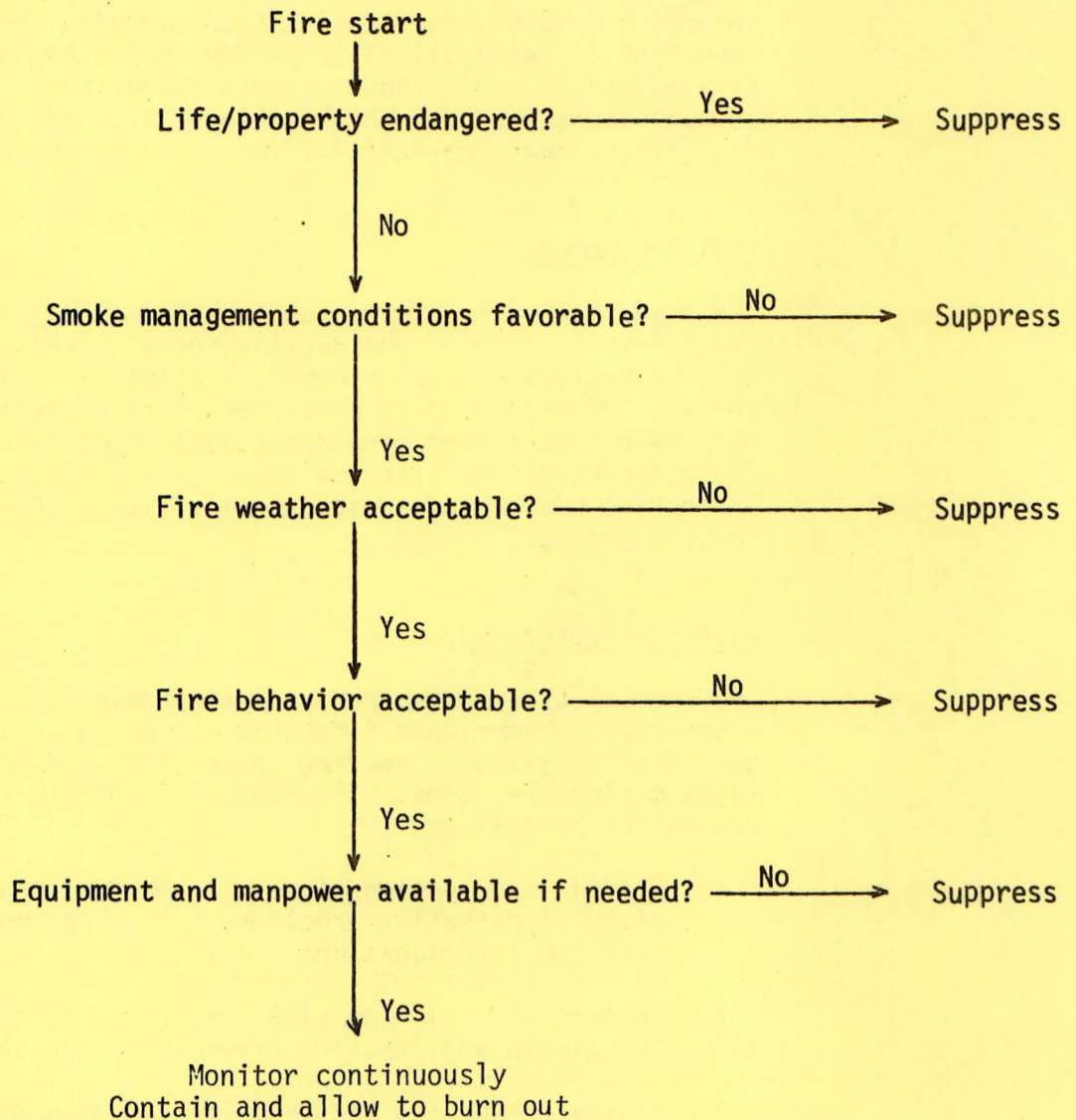
Unplanned fires will be permitted before June 1 and after September 30, when they are achieving objectives. Regular season fires will be suppressed because of potential danger to life and property of special area users. Figure 26 is the decision flow chart for a fire in the special areas. It will be used when a fire starts, and if necessary, while it is burning.

The objectives of allowing management fires in the special areas are:

1. Hazard reduction of litter accumulation and slash from logging dangerous, damaged, or infected trees.
2. Rejuvenate the undergrowth.

Figure 26

Decision flow chart for fires in the special fire management areas
which occur before June 1 and after September 30



F. Prescribed Fire

Prescribed fire has had limited application in the special areas since it has been used only to clean up slash from selective logging, development, construction, and other operations. The application of fire will be expanded to rejuvenate the undergrowth, reduce ladder fuels and hazardous accumulations, enhance the visual quality, and demonstrate the effects and benefits of fire to the public.

G. Fuel Management

The objective of fuel management will be treatment of all slash resulting from construction, development, dangerous tree removal, and other operations within existing or planned areas. Treatment can be prescribed fire or mechanical methods, whichever best serves land management objectives. Natural fuel concentrations or other site-specific fuel modification where fire will be prescribed shall have an EAR completed for the project.

H. Wildfire Prevention

The special areas have the smallest acreage of the fire management areas. Man-caused fires have been few, only seven in a period of 39 years. However, these accounted for all of the fires during that time. The objectives of the wildfire prevention program are:

1. Wildfire prevention signs will be posted in all areas and aimed at potential problems, i.e., unattended campfires, safe campfire locations, smoking, etc.
2. Contact will be made with area users by the Recreation Technician and the Fire Prevention Specialist.
3. At Yaak River and Bad Medicine campgrounds, a portion of the grounds will be underburned and posted with a sign to explain to recreationists the purpose of using fire to treat natural fuels, rejuvenate the vegetation, and enhance the visual quality.

I. Wildfire Suppression

The goal for wildfire suppression is to provide well planned and executed fire protection and fire use programs. Fire suppression will be fast, energetic, and thorough with a high degree of regard for personal safety, property, and resources. If a

wildfire escapes initial attack, an escaped fire situation analysis will be made to determine the most logical, cost-effective suppression.

Fire suppression measures and techniques will be used that are compatible with objectives for managing the natural state of these areas as directed by the Kootenai National Forest Land Use Plans. The following guidelines will be used:

1. Fire suppression structures and developments shall, when feasible, be located outside of these areas.
2. Preference shall be given to methods and equipment which least alter the landscape or disturb the land. Heavy equipment will not be used except by approval of the Forest Supervisor.
3. Fire suppression activities will strive for minimal damage to resources, i.e., not felling all snags, minimum width for firelines, etc. Sites that have been significantly damaged will be rehabilitated.

XII. PRESUPPRESSION

Presuppression is planning and/or work accomplished in advance of fire occurrence (either planned or unplanned ignitions). The objective is to have ready an effective fire management organization utilizing Forest Service, private, and publicly owned (city, state, or federal) fire equipment, manpower, and supplies. The goals of presuppression planning are:

1. Protection forces will be maintained at a level based on the 1972 Fire Planning Process (Integrated Fire Control Organization and Financial Plan, 5100-2). However, due to annual variations in fire management funding and fluctuations in the size of suppression forces, local cooperative agreements, memorandums of understanding, and equipment and manpower will be used in emergency fire situations to supplement Forest Service fires. Arrangements will be made prior to April 1 of each year with the various cooperators.
2. Preattack planning will be completed for the District to improve effectiveness of fire suppression activities. This entails identification and inventory of existing water sources, firecamp locations, natural fuel breaks, helispots, etc., and maintenance of these facilities.

XIII. OPERATIONAL PROCEDURES FOR MANAGEMENT FIRES

A. Detection

Fires will be detected by conventional means and reported to the dispatcher.

1. Lookout Duties.

The lookout will report the following information from the Detection Fire Behavior Report (form 14-5100-5) (appendix I).

2. Aerial Observer Duties.

The duties of the aerial observer are essentially the same as those given for lookouts.

3. Other.

In the event that a fire is reported by a local resident, traveler, etc., the person receiving the report is responsible for obtaining information about the fire location, size, etc. A 14-5100-5 form may be used to request information.

Following the report, a person will be dispatched to obtain a legal description of the location and an accurate description of the fire's behavior. A 14-5100-5 form should be used to record information.

B. Dispatch

After the initial report, the dispatcher informs the AFMO and/or the FMO. If the fire is outside the prescription criteria, suppression forces will be dispatched. When it is a potential management fire, an evaluator will be sent to assess the situation. At the same time, manpower and equipment are dispatched so no time is lost if the decision is to suppress the fire. The amount of manpower and equipment is predetermined by the pre-dispatch system and the Manning Class level that has been prepared for each fire management area.

At this time, management fires will be considered statistical fires and will require an Individual Fire Report (Form 5100-29).

C. Evaluation

After report of a fire in a management area, an evaluator, usually the AFMO, will be dispatched to assess the fire and fuels situation. This person will have Division Boss qualifications or be knowledgeable in fire behavior, effects, and management.

The duties of the evaluator are:

1. To fill out the Management Fire Behavior Report.
2. To evaluate the fire potential and fuels situation.
3. To note access routes.
4. To report findings to the Management Fire Committee.

D. Determination of Management Fires

The Management Fire Committee, an interdisciplinary group, makes the decision that a fire qualifies as a management fire. The District Ranger has authority to approve or disapprove the committee's decision. In situations where other factors affect the decision the S.O. Fire Staff will be involved. See Section V. Management Fire Committee for a detailed discussion of the decision process.

E. Monitoring

A management fire will be analyzed daily by an aerial or ground monitor who will have Division Boss qualifications or be knowledgeable in fire behavior, effects, and management. The primary objective is to assess fire behavior and fuels in order to make a prognosis of the fire potential. The degree of surveillance depends on potential control problems. In some cases, monitoring may have to be done more than once a day. On low risk fires, the Management Fire Committee may reduce the Division Boss level of qualifications for the monitor.

The monitor has the following responsibilities daily:

1. To fill out the Management Fire Behavior Report.
2. To map the fire and note access routes.
3. To note significant changes in on-site weather, fuels, fire behavior and direction, fire size, topography, smoke, etc., which may affect the prescription criteria.
4. To report findings to the Management Fire Committee.

F. Notification

A system of communication is necessary to provide appropriate people, groups, and agencies with the details of a management fire. The following responsibilities have been assigned:

1. The Troy dispatcher will:
 - a. Notify the S.O. Fire Staff (fire desk) about a management fire and provide the fire management area, legal description, size, fuels, prognosis, and planned action.

- b. Relay daily the monitor's report to the S.O. Fire Staff and action taken by the Management Fire Committee.
- c. Keep a permanent chronological log daily which contains the monitor's reports and Management Fire Committee's decisions.
- d. Notify state and private landowners in the vicinity of a fire.
- e. Know the fire management plan and be aware of any management fires on the District in order to be able to answer inquiries from the public or in-Service personnel.
- f. Provide information to news media on request.

2. The S.O. Fire Staff will:

- a. Report daily the status of all management fires to the Supervisor, Resource Branch Chief, and other Districts on the Kootenai National Forest. The same report will be given to the Idaho Panhandle National Forest when fires are burning in management areas adjacent to that Forest.
- b. Know the fire management plan and be aware of any management fires on the District in order to be able to answer inquiries from the public or in-Service personnel.
- c. Provide information to the news media on request.
- d. Report daily to the Region One Fire Coordinator by teletype the status of all management fires. The report shall include the fire name, location, date started, estimated acreage, and major changes since last report.

G. Communications

When radio communications are poor, a backup system will be used. This may entail a portable or mobile unit set up on a relay point. Most areas on the District which have poor radio reception are known, so when an evaluator or monitor is sent a relay system can also be dispatched. If communications fail when the evaluator is assessing a fire, he has authority to suppress it if he feels it should not be allowed to burn.

H. Law Enforcement

All man-caused fires will be investigated. If a man-caused fire is classified as a management fire, the Forest Service assumes responsibility. Criminal action will be taken against the person(s) starting the fire, but no civil action will be taken if it is declared a management fire. The Forest Law Enforcement Coordinator will be informed of the details about man-caused management fires.

I. Inform and Involve

Several radio interviews, newspaper articles, presentations, (service clubs, schools etc), and a brochure have been used to explain the Troy Fire Plan to the public (appendix J). When the plan is implemented these forms of communication will continue to be used to inform people about management fires and the fire plan.

The District will handle information about management fires. When there are multiple fires or compounding factors, the District and the S.O. Fire Staff will release information. The daily status reports will be available from the District and S.O. dispatchers.

When people report fires which have management status, the dispatcher will relate that it is a management fire and explain the purpose of allowing it to burn and that it is being monitored. In addition, the person will be thanked for calling and asked to continue to report other fires. CB radios with emergency channel 9 will be located at both lookouts and the ranger station to handle fire reports and give information about management fires.

XIV. LITERATURE CITATIONS AND REFERENCES

1. Byram, G. M. 1959. Combustion of forest fuels. In: Forest Fire Control and Use, 82 pp. K. P. Davis, ed. McGraw-Hill Book, New York.
2. Davis, K. M., B. D. Clayton, and W. C. Fischer. 1978. Fire ecology of Lolo National Forest habitat types. (Ms. submitted for publ.)
3. Deeming, J. E., R. E. Burgan, and J. D. Cohen. 1977. The National Fire-Danger Rating System--1978. USDA For. Serv. Gen. Tech. Rep. INT-39, 63 pp. Intermtn. For. and Range Exp. Stn., Ogden, Utah.
4. Deeming, J. E., J. W. Lancaster, M. A. Fosberg, R. W. Furman, and M. J. Schivder. 1972. The National Fire-Danger Rating System. USDA For. Serv. Res. Pap. RM-84, 165 pp. Rocky Mtn. For. and Range Exp. Stn., Fort Collins, Colo., Revised 1974.
5. Erickson, A. W. 1977. Cabinet Mountains grizzly bear management study. USDA For. Serv. Northern Region Contract No. 262-46, 26 pp.
6. Finklin, A. J. 1978. Lightning occurrence in the Libby and Troy Ranger Districts, Kootenai National Forest, Montana. USDA For. Serv. Gen. Tech. Rep., Unpub. Rep. Intermtn. For. and Range Exp. Stn., Ogden, Utah.
7. Lancaster, J. W. 1978. Fire management applications of the National Fire-Danger Rating System--1978. National Wildfire Coordinating Group, 17 pp.
8. Mealey, S. P., C. J. Jonkel, and R. Demarchi. 1977. Habitat criteria for grizzly bear management. In proc. 13th Cong. of Game Biol, 13 pp.
9. Paulson, N., W. A. Hough, and J. O. Baker, Jr. 1978. The Clean Air Act: an analytical discussion. USDA For. Serv., Wash. Office, 24 pp.
10. Pfister, R. D., B. L. Kovalchik, S. F. Arno, and R. C. Presby. 1977. Forest habitat types of Montana. USDA For. Serv. Gen. Tech. Rep. INT-34, 174 pp. Intermtn. For. and Range Exp. Stn., Ogden, Utah.
11. USDA For. Serv. 1975. Environmental Statement, Multiple Use Plan--Callahan Planning Unit; Troy Ranger District, Kootenai National Forest. RI-75-1 USDA-FS-FES (Adm).
12. USDA For. Serv. 1976. Environmental Statement, Land Use Plan--O'Brien, Seventeenmile, and Cross Mountain Planning Units; Troy, Libby, and Yaak Ranger Districts, Kootenai National Forest. RI-76-7 USDA-FS-FES (Adm).

13. USDA For. Serv. 1976. Teton Wilderness fire management plan. Bridger-Teton National Forest, Intermtn. Region.
14. USDA For. Serv. 1977. Long-range multiple-use planning on the Kootenai National Forest, public information mailer for the Bull Lake-Napoleon Planning Unit; Troy and Cabinet Ranger Districts, Kootenai National Forest, 36 pp.
15. USDA For. Serv. 1978. Draft Environmental Statement, Land Management Plan--Keeler Planning Unit; Troy Ranger District, Kootenai National Forest. R1-78-6 USDA-FS-FES (Adm).
16. USDA For. Serv. 1978. Draft Environmental Statement, Land Management Plan--Star Planning Unit; Troy Ranger District, Kootenai National Forest. R1-78-8 USDA-FS-FES (Adm).
17. USDA For. Serv. 1978. Fire management in the Selway-Bitterroot Wilderness, Moose Creek Ranger District, Nez Perce National Forest, Northern Region.
18. USDA For. Serv. 1978. Fire management prescriptions for Selway-Bitterroot Wilderness in the West Fork District, Bitterroot National Forest, Northern Region.
19. USDA For. Serv. 1978. Lolo National Forest revised fire management policy. Northern Region.
20. USDA For. Serv. 1978. West Slope fire management plan and environmental report. Targhee National Forest, Intermtn. Region.
21. USDI Nat'l Park Serv. 1976. The natural role of fire, a fire management plan. Yellowstone National Park, Rocky Mountain Region.



APPENDIXES

APPENDIX A. Glossary of Terms.

1. Confine - To confine a fire is to restrict is within determined boundaries established either prior to the fire, during the fire, or in an escaped fire situation analysis.
2. Contain - To contain a fire is to surround it and any spot fires with control lines which can reasonably be expected to check the fire's spread under prevailing conditions.
3. Control - To control a fire is to complete a line around it, any spot fires, and any interior islands to be saved; to burn out any unburned area adjacent to the fire side of the control line; and to cool down all hot spots that are immediate threats to the line until the line can reasonably be expected to hold under foreseeable conditions.
4. Escaped fire - A fire which has exceeded the first calculation of initial attack resources and reasonable reinforcements necessary for prompt control or that exceeds its fire prescription. (See situation analysis in this glossary.)
5. Fire management - All activities required for the protection from fire and the use of fire to meet land management goals and objectives.
6. Fire management areas - One or more parcels of land with common fire management objectives as indicated by land management plans and interdisciplinary resource management.
7. Fire management objectives - The planned, measurable results desired from fire protection and use based on land management goals and objectives.
8. Fuel Model C - Open pine stands typify Model C fuels. Perennial grasses and forbs are the primary ground fuel but there is enough needle litter and branchwood present to contribute significantly to the fuel loading. Some brush and shrubs may be present but they are of little consequence.
9. Fuel Model G - Fuel Model G is used for dense conifer stands where there is a heavy accumulation of litter and downed woody material. Such stands are typically overmature and may also be suffering insect, disease, wind, or ice damage -- natural events that create a very heavy buildup of dead material on the forest floor. The duff and litter are deep and much of the woody material is more than three inches in diameter. The undergrowth is variable, but shrubs are usually restricted to openings.

10. Fuel Model H - The short needled conifers are represented by this model. In contrast to Model G fuels, Model H describes a healthy stand with sparse undergrowth and a thin layer of ground fuels. Fires are typically slow spreading and are dangerous only in scattered areas where the downed woody material is concentrated.
11. Fuel Model I - Fuel Model I was designed for clearcut conifer slash where the total loading of materials less than six-inches (15 cm) in diameter exceeds 25 tons/acre (56 t/ha). After settling and the fines (needles and twigs) fall from the branches, Fuel Model I will overrate the fire potential. For lighter loadings of clearcut conifer slash, use Fuel Model J, and for light thinnings and partial cuts where the slash is scattered under a residual overstory, use Fuel Model K.
12. Fuel Model J - This model complements Fuel Model I. It is for clearcuts and heavily thinned conifer stands where the total loading of materials less than six-inches (15 cm) in diameter is less than 25 tons/acres (56 t/ha). Again, as the slash ages, the fire potential will be overrated.
13. Fuel Model K - Slash fuels from light thinnings and partial cuts in conifer stands are represented by Fuel Model K. Typically the slash is scattered about under an open overstory.
14. Intolerable loss - The level of damage or loss greater than that which may be sustained by a given resource and still achieve targeted management production goals.
15. Lightning activity level (LAL) - A numerical rating of 1 to 6 that is keyed to the start of thunderstorms and the frequency and character of cloud-to-ground lightning either forecasted or observed on a rating area during the rating period.
16. Limited suppression - Suppression of any portion of a fire spread which threatens the boundary of the fire management area, is not burning in prescription, or is not fulfilling a management objective.
17. Management fire - A fire which is burning in a specified area under predetermined conditions and which is achieving identified management objectives.
18. Modified attack - Modified or delayed suppression action on unwanted fires on Manning Class 3-minus days or less. Reasons for modified attack include:
 - a. Economical suppression (e.g., strength of force)
 - b. Wet or hazardous weather
 - c. Time of day and accessibility of fire
 - d. Number of fire starts (priority suppression)
 - e. Crew safety
 - f. Most logical method of attack

19. Prescription criteria - A predetermined set of criteria established for fuel and weather conditions, public safety, smoke management conditions, available suppression forces, and boundary considerations within which a fire will be constrained.
20. Situation analysis - An analysis of those factors influencing suppression of an escaped fire from which a plan of action will be developed. The analysis includes the development of alternative suppression strategies and net effect of each.
21. Suppression fire - A fire that is not wanted because it threatens life and property or because it does not fit management objectives. Suppression will be full attack or modified attack.
22. Total suppression - Suppression forces will be used that are considered necessary to gain control before the next critical burning period. If total suppression efforts fail, an escaped fire situation analysis will be made.
23. Wildfire - Any fire that is not a management fire or a prescribed fire.

APPENDIX B. Weather records.

10 DAY AND MONTHLY SUMMARIES OF ***STATE OF THE WEATHER ***

RELATIVE FREQUENCY OF OCCURRENCE OF DAY-M VALUES (1500 MST)

TROY R S (240112) 1960-1977

STATE OF THE WEATHER

PERIOD BEGINS	0	1	2	3	4	5	6	7	8	9	N. DAYS	MODE	RANGE
JUN 1	12.5	31.8	25.1	17.0		1.1	5.7		5.7		88	1	0 - 8
JUN 11	19.0	25.7	13.3	27.6		1.9	8.6		2.9		105	3	0 - 8
JUN 21	20.7	30.2	15.5	21.6		2.6	2.6		4.3	2.5	116	1	0 - 9
JUL 1	26.8	29.3	22.8	14.2			3.9		3.1	.3	127	1	0 - 9
JUL 11	36.9	31.5	15.2	8.5		.8	3.8		1.5	.3	130	0	0 - 9
JUL 21	34.5	39.7	14.1	8.5	.7		2.8			.7	142	1	0 - 9
AUG 1	41.3	25.8	15.2	8.7			7.2			.7	138	0	0 - 9
AUG 11	34.1	27.5	14.5	14.5			7.2	.7		1.4	139	0	0 - 9
AUG 21	26.1	23.5	25.5	14.4	1.3	.7	7.8		.7		153	0	0 - 8
SEP 1	32.6	23.7	20.0	16.3	.7	.7	5.2		.7		135	0	0 - 8
SEP 11	30.6	18.5	20.4	19.4		1.9	8.3		.9		108	0	0 - 8
SEP 21	51.9	12.7	10.1	19.0			2.5		2.5	1.3	79	0	0 - 9
JUN	17.8	29.4	17.8	22.3		1.9	5.5		4.2	1.0	309	1	0 - 9
JUL	32.8	33.1	17.5	10.3	.3	.3	3.5		1.5	.8	399	1	0 - 9
AUG	33.6	25.9	18.5	12.6	.5	.2	7.5	.2	.2	.7	429	0	0 - 9
SEP	36.6	19.3	17.7	18.0	.3	.9	5.6		1.2	.3	322	0	0 - 9

Code

State of Weather

- 0 Clear (less than 1/10th of sky cloud covered).
- 1 Scattered clouds (1/10th to 5/10ths cloud covered).
- 2 Broken clouds (6/10ths to 9/10ths cloud covered).
- 3 Overcast (more than 9/10ths of sky cloud covered).
- 4 Foggy.
- 5 Drizzling (precipitation of numerous fine droplets; in some areas referred to as "misting").
- 6 Raining.
- 7 Snowing or sleeting.
- 8 Showering (showers in sight or occurring at station).
- 9 Thunderstorm in progress (lightning seen or thunder heard). At lookout stations and others having unrestricted visibility, record thunderstorm in progress only when activity is not more than 30 miles away.

10 DAY AND MONTHLY SUMMARIES OF ***RELATIVE HUMIDITY ***

RELATIVE FREQUENCY OF OCCURRENCE OF DAILY VALUES (1500 MST)

TROY R S (240112) 1960-1977

RELATIVE HUMIDITY PERCENT

PERIOD	BELOW	10	20	30	40	50	60	70	80	90					
BEGINS	10	19	29	39	49	59	69	79	89	ABOVE	% DAYS	MEAN	SD	MEDIAN	RANGE
JUN 1		3.4	17.0	28.4	17.0	17.0	6.8	5.7	3.4	1.1	88	44	18	40	16 - 90
JUN 11		2.9	19.1	30.5	9.5	16.2	4.8	12.4	3.8	1.2	105	45	19	39	17 - 94
JUN 21	.9	8.6	20.7	24.1	21.6	7.8	6.9	5.2	3.4	.9	115	41	18	37	5 - 90
JUL 1		18.9	34.5	22.0	6.3	6.3	4.7	5.5	1.6		127	34	17	29	13 - 89
JUL 11		15.4	43.1	17.7	11.5	3.8	2.3	2.3	3.1	.5	130	33	17	27	11 - 91
JUL 21	.7	31.7	40.1	12.7	3.5	3.5	4.2	2.1	1.4		142	29	16	23	9 - 85
AUG 1		31.9	25.8	15.2	12.3	4.3	2.2	4.3	.7	2.2	138	32	18	26	10 - 94
AUG 11	6.5	13.6	29.7	15.2	10.1	11.6	3.6		1.4	2.2	138	32	19	27	5 - 95
AUG 21	.7	15.0	24.8	22.9	14.4	7.2	6.5	2.6	3.9	2.0	153	38	20	33	7 - 100
SEP 1		9.6	32.5	26.7	11.9	7.4	5.2	2.2	2.2	2.2	135	37	18	32	11 - 100
SEP 11		5.6	23.1	33.3	18.5	5.6	2.8	2.8	4.6	3.7	108	40	19	35	14 - 94
SEP 21	2.5	10.1	7.5	25.3	22.8	13.9	6.3	2.5	6.3	2.5	79	44	21	41	5 - 94
JUN	.3	5.2	19.8	27.5	16.2	13.3	6.1	7.8	3.6	1.3	309	43	18	38	5 - 94
JUL	.3	22.3	19.3	17.3	7.0	4.5	3.8	3.3	2.0	.3	399	31	17	26	9 - 91
AUG	2.3	21.9	27.0	17.9	12.4	7.7	4.2	2.3	2.1	2.1	429	34	19	29	5 - 100
SEP	.6	9.4	23.3	28.6	16.8	8.4	4.7	2.5	4.0	2.8	322	40	19	35	5 - 100

10 DAY AND MONTHLY SUMMARIES OF *** TEMPERATURE ***

RELATIVE FREQUENCY OF OCCURRENCE OF DAILY VALUES (1500 MST)

TROY R S (240112) 1960-1977

TEMPERATURE DEG F

PERIOD	BELOW	55	60	65	70	75	80	85	90	95					
BEGINS	55	59	64	69	74	79	84	89	94	ABOVE	% DAYS	MEAN	SD	MEDIAN	RANGE
JUN 1	3.4	11.4	11.4	20.5	20.5	20.5	5.7	4.5	2.3		88	70	9	70	51 - 91
JUN 11	2.9	10.5	19.0	13.3	20.0	8.6	12.4	9.5	3.8		105	71	11	70	51 - 93
JUN 21	3.4	6.9	15.5	12.9	13.8	13.8	15.5	12.1	4.3	1.7	115	73	11	73	51 - 98
JUL 1	.8	1.6	7.9	7.1	15.5	14.2	15.0	15.7	9.4	11.5	127	80	11	80	49 - 100
JUL 11		8	5.2	6.2	10.8	13.8	19.2	19.5	16.9	7.7	130	82	10	82	55 - 104
JUL 21	.7	3.5	4.9	5.6	10.6	16.9	20.4	29.6	7.7		142	84	9	85	58 - 99
AUG 1	.7	2.9	3.6	13.0	10.1	18.1	17.4	16.7	17.4		139	84	10	84	57 - 103
AUG 11		3.6	5.1	8.7	12.3	9.4	21.7	21.0	8.0	10.1	138	81	11	82	57 - 103
AUG 21	2.0	6.5	8.5	9.2	11.1	19.6	17.0	9.8	11.8	4.5	153	77	11	77	51 - 99
SEP 1	3.7	7.4	11.1	10.4	11.1	19.3	18.5	14.1	3.7	.7	135	74	11	76	49 - 95
SEP 11	11.1	11.1	12.0	20.4	17.6	12.0	5.6	9.3	.9		108	58	11	58	42 - 90
SEP 21	10.1	7.6	15.2	19.0	25.6	7.6	7.6	3.8	2.5		79	69	10	69	47 - 94
JUN	3.2	9.4	15.5	15.2	17.8	13.9	11.7	9.1	3.6	.5	309	72	10	71	51 - 98
JUL	.3	1.0	5.9	6.0	10.8	12.8	17.0	18.3	19.0	9.0	399	82	10	83	49 - 104
AUG	.7	3.7	5.5	7.2	12.1	13.3	18.9	15.9	12.1	10.5	429	80	11	81	51 - 103
SEP	7.8	9.7	12.4	15.8	17.1	14.0	11.5	9.9	2.5	.3	322	71	11	71	42 - 95

10 DAY AND MONTHLY SUMMARIES OF *** WIND SPEED ***

RELATIVE FREQUENCY OF OCCURRENCE OF DAILY VALUES (1500 MST)

TRDY R S (240112) 1960-1977

WIND SPEED MPH

PERIOD	BELOW	3	6	9	12	15	18	21	24	28	AND ABOVE	N. DAYS	MEAN	SD	MEDIAN	RANGE
BEGINS	3	5	8	11	14	17	20	23	27							
JUN 1	29.5	44.3	22.7	2.3	1.1							88	4	3	3	0 - 14
JUN 11	24.8	41.0	25.7	7.6	1.0							105	5	3	4	0 - 12
JUN 21	16.4	18.4	13.5	8.6	2.5							116	5	3	5	0 - 14
JUL 1	14.2	48.0	23.5	11.0	3.1							127	5	3	4	0 - 14
JUL 11	16.2	55.4	21.5	6.2	.8							130	5	2	4	0 - 12
JUL 21	17.6	41.5	22.5	9.2	2.1							142	5	3	4	0 - 13
AUG 1	26.8	34.1	22.0	7.2	2.2	.7						138	5	3	4	0 - 15
AUG 11	33.3	33.3	24.6	8.0						.7		138	4	4	4	0 - 31
AUG 21	31.4	41.4	20.3	5.9	.7							153	4	3	3	0 - 14
SEP 1	31.9	37.8	24.4	5.2	.7							135	4	3	3	0 - 12
SEP 11	35.2	41.7	19.5	3.7	.9							108	4	3	3	0 - 13
SEP 21	43.0	38.0	12.7	3.4	2.5							79	3	3	3	0 - 13
JUN	23.0	41.1	27.8	6.5	1.6							309	5	3	4	0 - 14
JUL	16.0	48.1	25.1	8.8	2.0							399	5	3	4	0 - 14
AUG	30.5	36.6	24.5	7.0	.9	.2						429	4	3	4	0 - 31
SEP	35.7	39.1	19.6	4.3	1.2							322	4	3	3	0 - 13

10 DAY AND MONTHLY SUMMARIES OF *** WIND DIRECTION ***

RELATIVE FREQUENCY OF OCCURRENCE OF DAILY VALUES (1500 MST)

TRDY R S (240112) 1960-1977

WIND DIRECTION 8 POINT

PERIOD	CALM	NE	E	SE	S	SW	W	NW	N	N. DAYS	MODE
BEGINS											
JUN 1	11.4	5.7	3.4	26.1	20.5	2.3	4.5	13.6	12.5	88	SE
JUN 11	2.9	3.8	3.8	43.8	19.0	6.7	1.9	9.5	8.6	105	SE
JUN 21	.9	.9	5.2	50.0	19.8	6.0	2.6	9.5	5.2	116	SE
JUL 1	1.6	3.9	4.7	41.7	17.3	4.7	3.9	12.6	9.4	127	SE
JUL 11	.8	3.8	3.1	35.4	21.5	8.5	2.3	17.7	6.9	130	SE
JUL 21	2.8	5.3	5.5	34.4	12.0	9.2	2.8	17.6	9.2	142	SE
AUG 1	2.2	5.1	2.2	29.7	19.6	12.3	4.3	18.1	6.5	138	SE
AUG 11	2.9	5.1	2.9	34.1	15.9	12.3	2.9	15.2	8.7	138	SE
AUG 21	3.9	3.9	5.2	30.7	17.0	13.7	4.6	15.0	5.9	153	SE
SEP 1	5.9	4.4	1.5	24.4	20.7	17.8	3.7	13.3	8.1	135	SE
SEP 11	10.2	9.3	5.5	31.5	13.0	8.3	2.8	16.7	1.9	108	SE
SEP 21	6.3	8.9		22.4	17.7	10.1	5.1	27.8	1.3	79	NW
JUN	4.5	3.2	4.2	41.1	19.7	5.2	2.9	10.7	8.4	309	SE
JUL	1.9	4.9	4.5	37.1	15.8	7.5	3.0	16.0	4.5	399	SE
AUG	3.0	4.7	3.5	31.5	17.5	12.8	4.0	16.1	7.0	429	SE
SEP	7.5	7.1	2.8	26.4	17.6	12.7	3.7	18.0	4.3	322	SE

10 DAY AND MONTHLY SUMMARIES of *** 24 HR. PRECIP. AMOUNT ***

RELATIVE FREQUENCY OF OCCURRENCE OF DAILY VALUES (1500 MST)

TRAY R 5 (240112) 1960-1977

24 HR PRECIP AMOUNT IN X 100

PERIOD	NONE	1	5	10	20	30	40	50	100	150					
BEGINS	TRACE	4	9	14	29	39	49	99	149	ABOVE	N. DAYS	MEAN	SD	MEDIAN	RANGE
JUN 1	41.6	9.1	9.1	6.8	5.8	1.1	1.1	2.3	1.1	1.1	89	10	35	0	0 - 300
JUN 11	57.1	15.2	8.5	8.6	4.8	1.9	1.0	2.9			105	7	16	0	0 - 95
JUN 21	44.7	15.5	5.9	3.4	.9	.9	2.6	4.3	.9		115	7	20	0	0 - 147
JUL 1	76.4	7.9	7.1	6.3	.8		1.6				127	2	6	0	0 - 46
JUL 11	74.6	5.5	2.3	7.7	3.1	1.5	1.5	.8			130	4	9	0	0 - 50
JUL 21	90.1	2.3	.7	.7	.7	.7	.7				142	1	5	0	0 - 48
AUG 1	93.3	4.3	1.4	2.9	2.2	3.6	.7	.7	.7		138	4	13	0	0 - 100
AUG 11	79.0	3.4	4.3	3.5	2.9	2.2	2.2	1.4	.7		138	5	15	0	0 - 122
AUG 21	73.9	3.9	3.9	7.2	4.6	2.0	1.3	2.6	.7		153	6	15	0	0 - 119
SEP 1	78.5	7.4	4.4	3.7	3.0		.7	.7	1.5		135	5	20	0	0 - 150
SEP 11	74.1	7.4	1.9	9.3	4.6	.9		1.9			108	4	13	0	0 - 95
SEP 21	77.2	7.6	1.3	8.9			2.5	1.3	1.3		79	6	22	0	0 - 179
JUN	41.2	13.6	8.1	6.1	3.9	1.3	1.6	3.2	.6	.3	309	9	24	0	0 - 300
JUL	80.7	7.5	3.3	4.8	1.5	.8	1.3	.3			399	2	7	0	0 - 50
AUG	78.6	4.0	3.3	4.7	3.3	2.6	1.4	1.6	.7		429	5	15	0	0 - 122
SEP	76.7	7.5	2.9	6.8	2.8	.3	.9	1.2	.9		322	5	18	0	0 - 179

10 DAY AND MONTHLY SUMMARIES OF *** PRECIP. DURATION ***

RELATIVE FREQUENCY OF OCCURRENCE OF DAILY VALUES (1500 MST)

TRAY R 5 (240112) 1960-1977

PRECIP DURATION HOURS

PERIOD	BELOW	1	3	5	7	9	11	13	15	17					
BEGINS	1	2	4	5	8	10	12	14	16	ABOVE	N. DAYS	MEAN	SD	MEDIAN	RANGE
JUN 1	41.6	18.2	11.4	2.3	6.8						89	1	2	0	0 - 8
JUN 11	57.1	24.9	3.5	4.4	4.8						105	1	2	0	0 - 8
JUN 21	44.7	22.4	3.4	.9	9.6						115	1	2	0	0 - 8
JUL 1	76.4	15.7	5.3	.4	.8						127	1	1	0	0 - 8
JUL 11	74.6	13.1	9.5	1.5	2.3						130	1	2	0	0 - 8
JUL 21	90.1	7.0	1.2	.7	.7						142	0	1	0	0 - 8
AUG 1	93.3	3.0	1.4	3.4	3.6						138	1	2	0	0 - 8
AUG 11	79.0	3.7	3.5	2.2	3.6	2.2					138	1	2	0	0 - 10
AUG 21	73.9	3.5	7.8	3.3	4.5	.7	.7			.7	153	1	3	0	0 - 18
SEP 1	78.5	12.5	3.7	1.5	3.7						135	1	2	0	0 - 8
SEP 11	74.1	12.0	9.3	.9	2.8				.9		108	1	2	0	0 - 16
SEP 21	77.2	11.4	5.3		5.1						79	1	2	0	0 - 8
JUN	41.2	22.0	7.4	2.5	5.8						309	1	2	0	0 - 8
JUL	80.7	11.9	5.3	1.0	1.3						399	0	1	0	0 - 8
AUG	78.6	3.4	4.4	3.3	4.0	.9	.2			.2	429	1	2	0	0 - 18
SEP	76.7	12.1	5.2	.9	3.7				.3		322	1	2	0	0 - 16

10 DAY AND MONTHLY SUMMARIES OF *** 1 HR FUEL MOISTURE ***

RELATIVE FREQUENCY OF OCCURRENCE OF DAILY VALUES (1500 MST)

TRDY P. 5 (240112) 1960-1977

1 HR FUEL MOISTURE PERCENT

PERIOD	BELOW	4	8	12	16	20	24	28	32	36					
REGINS	4	7	11	15	19	23	27	31	35	ABOVE	N. DAYS	MEAN	SD	MEDIAN	RANGE
JUN 1		42.0	35.2	11.4	3.4	1.1	6.8				88	10	5	8	4 - 25
JUN 11		41.4	34.1	6.7	5.7		10.5				105	10	6	8	4 - 25
JUN 21	4.3	50.0	28.4	5.9	3.4	1.7	5.2				115	9	5	7	2 - 25
JUL 1	10.2	53.0	15.7	6.3	.8		3.9				127	7	5	5	2 - 25
JUL 11	16.2	63.1	10.0	3.9	1.5	.8	4.6				130	7	5	5	2 - 25
JUL 21	33.1	53.5	5.3	3.5	.7		2.8				142	5	4	4	2 - 25
AUG 1	28.4	40.6	9.4	2.2	1.4	.7	7.2				138	6	6	4	2 - 25
AUG 11	27.5	43.5	15.2	2.9	.7	1.4	8.7				138	7	7	5	1 - 25
AUG 21	20.3	48.4	14.4	3.9	2.6	1.3	9.2				153	8	7	5	1 - 25
SEP 1	11.1	40.0	17.0	4.4		1.5	5.9				135	7	5	5	2 - 25
SEP 11	8.3	54.4	21.3	3.7	1.9		10.2				108	8	6	6	2 - 25
SEP 21	12.7	49.4	25.3	3.8	1.3	5.1	2.5				79	8	5	6	1 - 25
JUN	1.6	45.0	32.4	8.1	4.5	1.0	7.4				309	10	6	7	2 - 25
JUL	20.3	50.6	10.5	4.5	1.0	.3	3.8				399	6	5	5	2 - 25
AUG	28.4	44.3	13.1	3.0	1.6	1.2	9.4				429	7	6	5	1 - 25
SEP	10.6	55.6	20.5	4.0	.9	1.9	6.5				322	8	6	6	1 - 25

10 DAY AND MONTHLY SUMMARIES OF *** 10 HR FUEL MOISTURE ***

RELATIVE FREQUENCY OF OCCURRENCE OF DAILY VALUES (1500 MST)

TRDY P. 5 (240112) 1960-1977

10 HR FUEL MOISTURE PERCENT

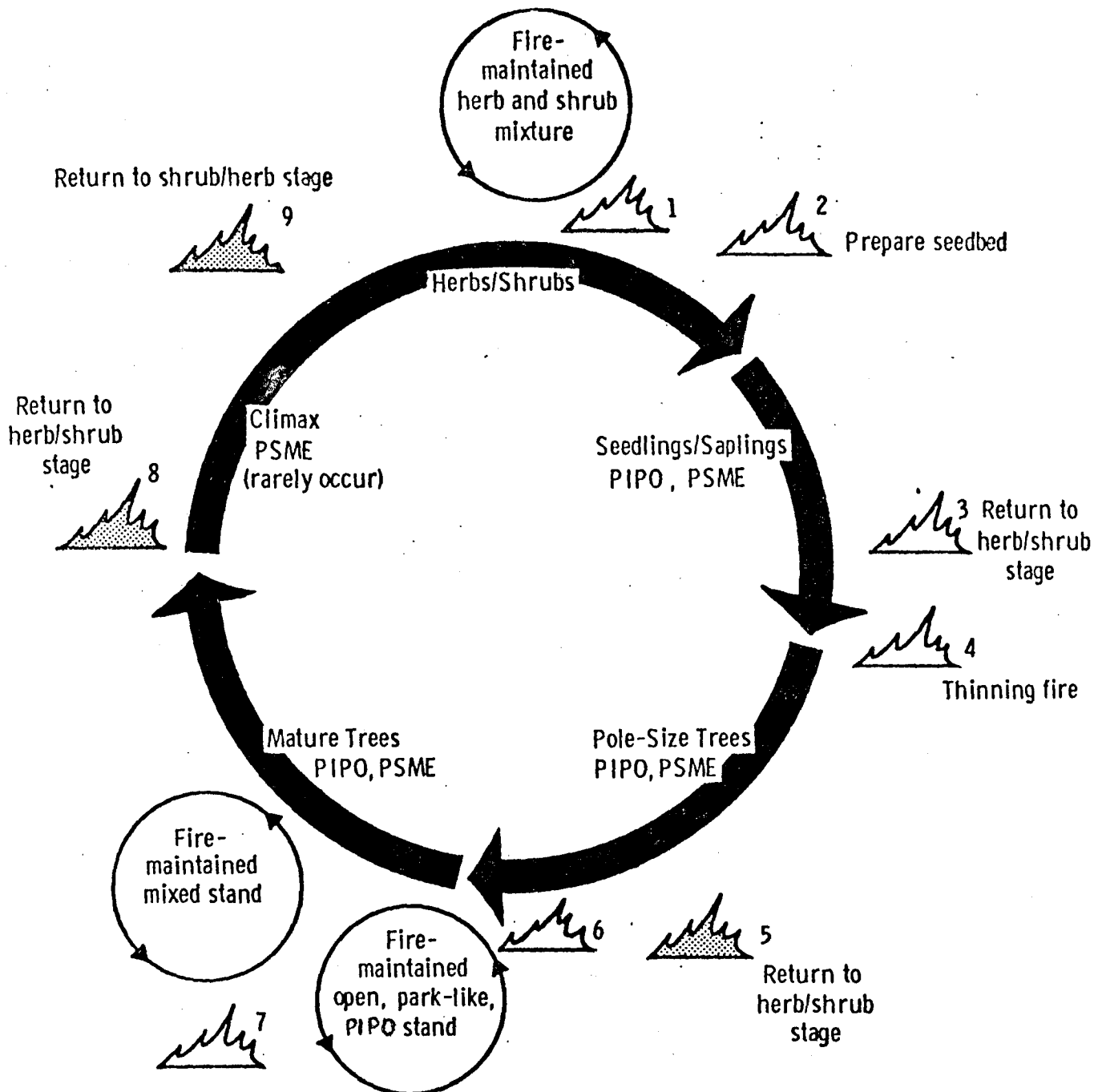
PERIOD	BELOW	4	8	12	16	20	24	28	32	36					
REGINS	4	7	11	15	19	23	27	31	35	ABOVE	N. DAYS	MEAN	SD	MEDIAN	RANGE
JUN 1		9.0	17.0	30.7	25.0	5.7	12.5		1.1		88	15	6	14	6 - 33
JUN 11		5.7	21.9	25.7	21.9	10.5	11.4		1.9		105	16	6	14	4 - 35
JUN 21		12.9	29.4	28.4	16.4	1.7	11.2	.9			115	14	6	12	5 - 28
JUL 1	3.4	20.5	40.9	20.5	7.1	2.4	4.7				127	11	5	10	2 - 25
JUL 11	15.4	23.1	31.5	16.9	4.6	2.3	6.2				130	10	6	8	2 - 25
JUL 21	19.7	39.4	25.3	9.2	1.4		3.5				142	7	5	5	2 - 25
AUG 1	17.0	29.3	17.4	5.1	2.2	1.4	8.7				138	8	7	5	2 - 25
AUG 11	26.1	30.4	22.5	4.3	3.6	2.2	10.1				138	9	7	6	2 - 37
AUG 21	24.8	32.7	15.4	11.4	2.0	.7	11.1	.7	2.0		153	9	8	6	2 - 43
SEP 1	11.9	40.0	25.2	12.6	2.2	1.5	6.7				135	9	6	7	2 - 25
SEP 11	7.4	33.3	32.4	10.2	3.7	.9	11.1		.9		108	10	7	8	3 - 34
SEP 21	11.4	31.5	36.2	13.9	3.8	1.3	3.8				79	9	5	8	2 - 25
JUN		9.4	23.0	28.2	20.7	5.8	11.7	.3	1.0		309	15	6	14	4 - 35
JUL	13.3	25.1	32.9	15.3	4.3	1.5	4.8				399	9	5	8	2 - 25
AUG	29.1	30.5	17.9	7.2	2.6	1.4	10.0	.2		.9	429	9	8	6	2 - 43
SEP	10.2	35.7	29.8	12.1	3.1	1.2	7.5		.3		322	9	5	9	2 - 34

APPENDIX C. Major habitat types on the Troy Ranger District, the relevant Fire Groups, and schematic diagrams of the role of fire in each group (taken from Pfister et al. 1977 and Davis et al. Ms. in prep.).

HABITAT TYPE		
Abbreviation	Common Name	Fire Group*
PSME/AGSP	Douglas-fir/bluebunch wheatgrass	2
PSME/PHMA	Douglas-fir/ninebark	2,3
PSME/LIBO	Douglas-fir/twinflower	3
PSME/CARU	Douglas-fir/pinegrass	2,3
PSMA/ARUV	Douglas-fir/kinnikinnick	2,3
ABGR/XETE	Grand fir/beargrass	7
ABGR/CLUN	Grand fir/queen's cup beadily	7
THPL/CLUN	Western redcedar/twinflower	7
THPL/OPHO	Western redcedar/devil's club	7
TSHE/CLUN	Western hemlock/twinflower	7
ABLA/CLUN	Subalpine fir/twinflower	5
ABLA/MEFE	Subalpine fir/menziesia	5
ABLA/XETE	Subalpine fir/beargrass	4,5
ABLA/LUHI	Subalpine fir/smooth woodrush	6
PIAL-ABLA	Whitebark pine-subalpine fir	8
Scree		8
Forested rock		8
Meadow		8
Grassy bald		8
Alder glade		8

*When two Fire Groups are given, the grouping depends on the phase. Local conditions should be evaluated before assigning a habitat type to a group.

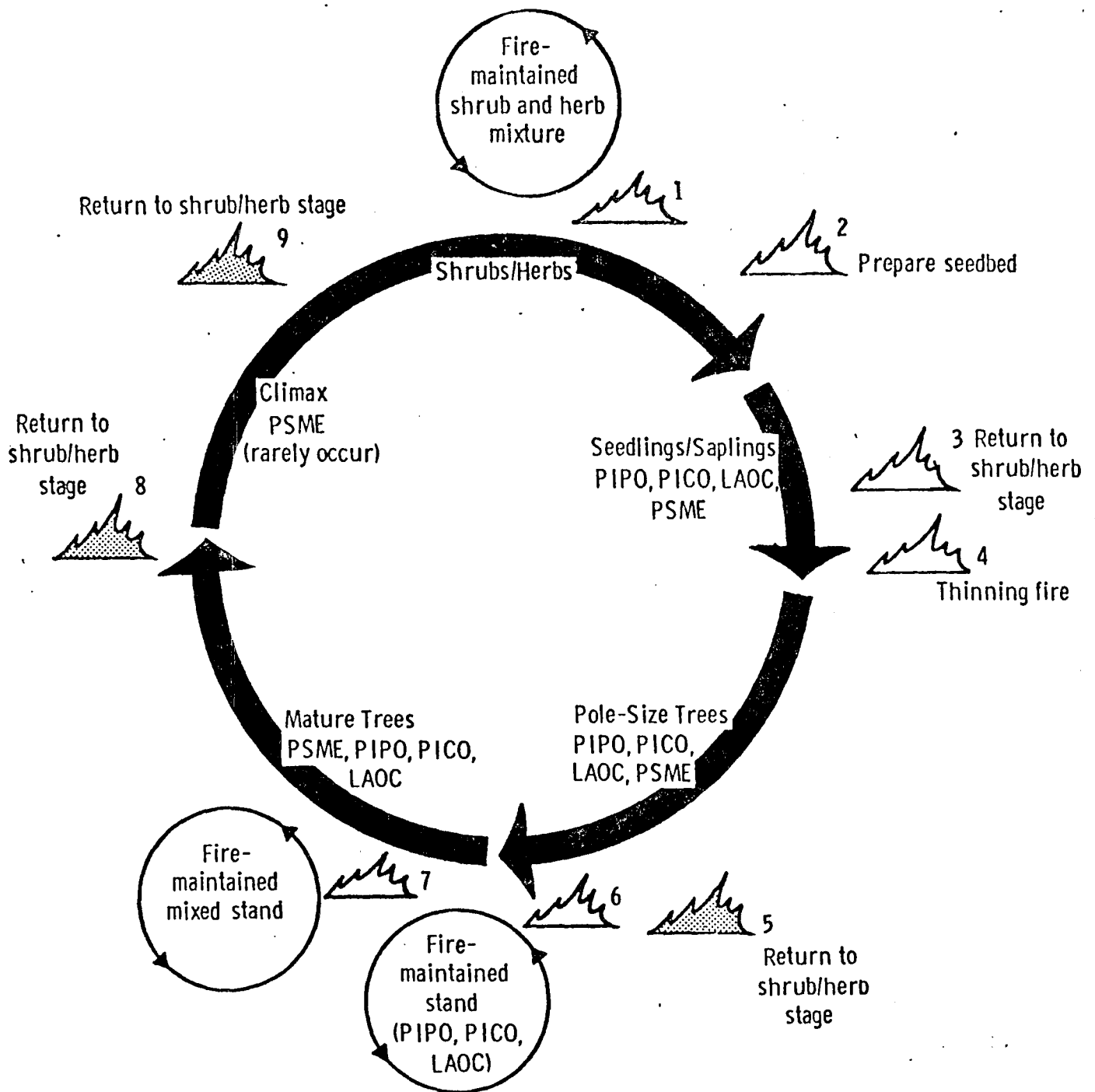
Fire Group Two--fire-maintained ponderosa pine stands in Douglas-fir habitat types.



Legend:

-  Natural process occurring over time
-  Light to moderate fire
-  Severe fire

Fire Group Three--Douglas-fir habitat types dominated by Douglas-fir.

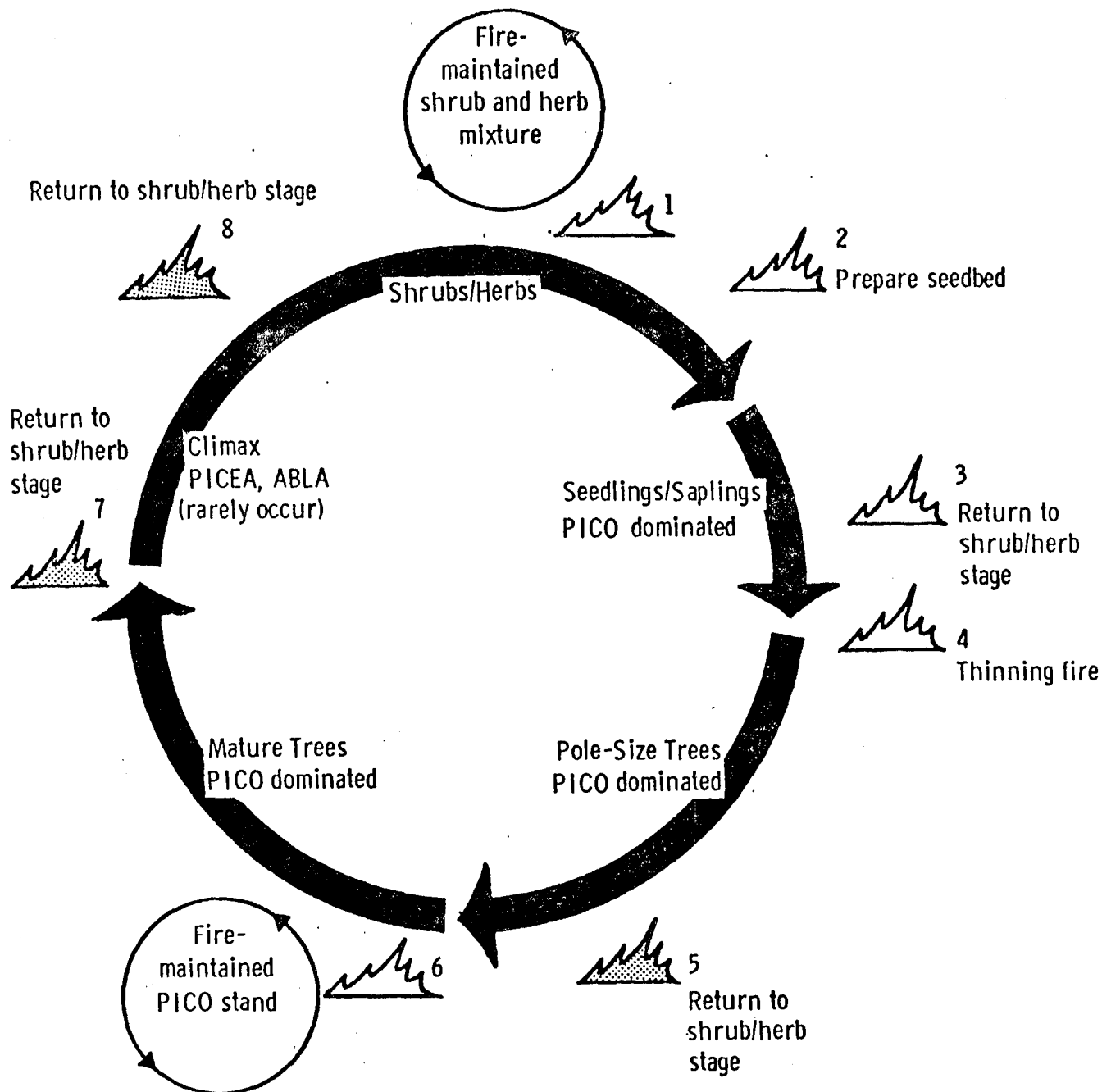


Legend :

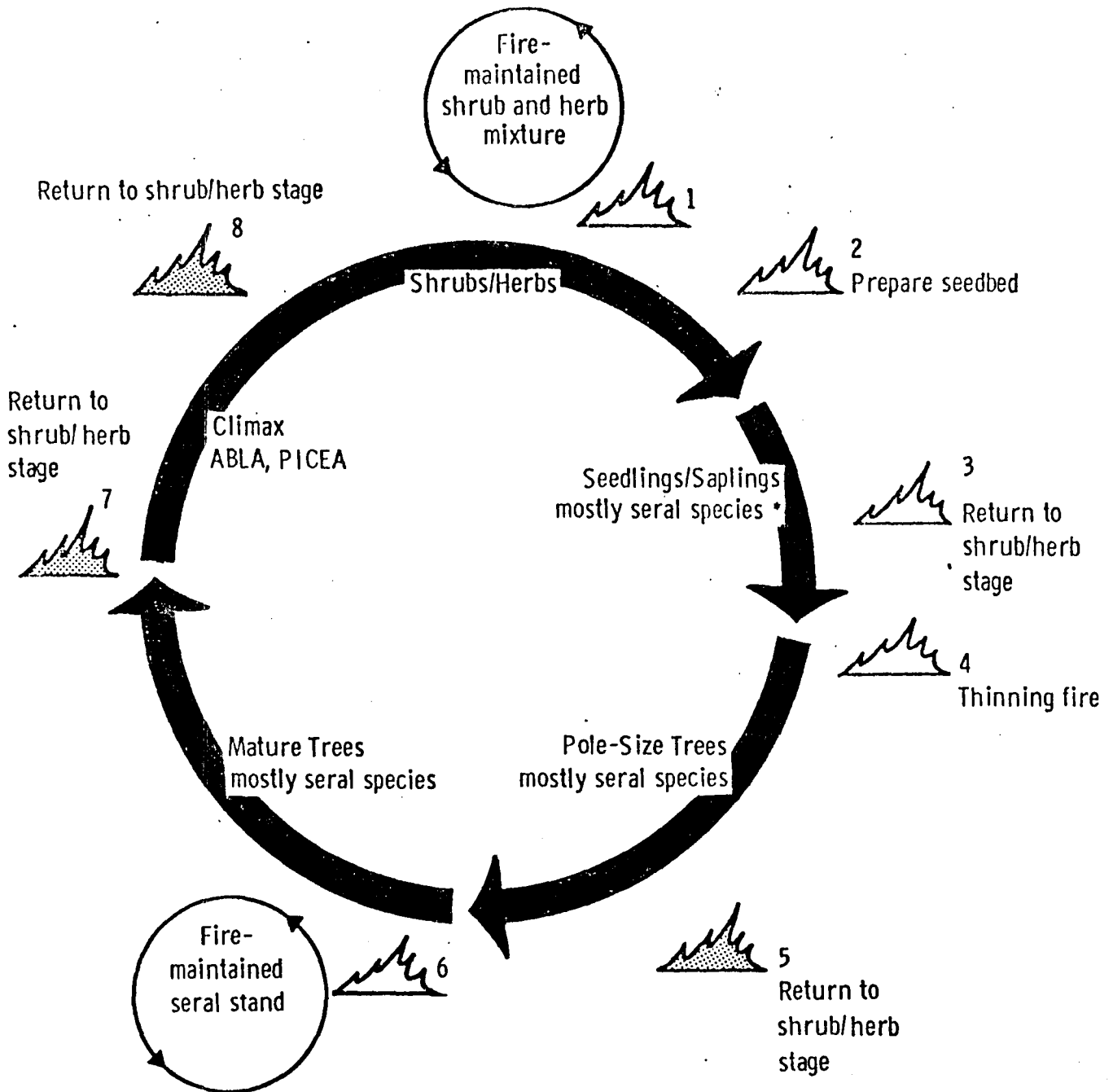
- ➔** Natural process occurring over time
- ~~~~~** Light to moderate fire
- ~~~~~** Severe fire

• Fire-maintained stands of ponderosa pine, lodgepole pine, or western larch could occur in PSME/VACA, and PSME/CARU-ARUV habitat types.

Fire Group Four--fire-maintained lodgepole pine stands in spruce and subalpine fir habitat types.



Fire Group Five--lower subalpine habitat types.

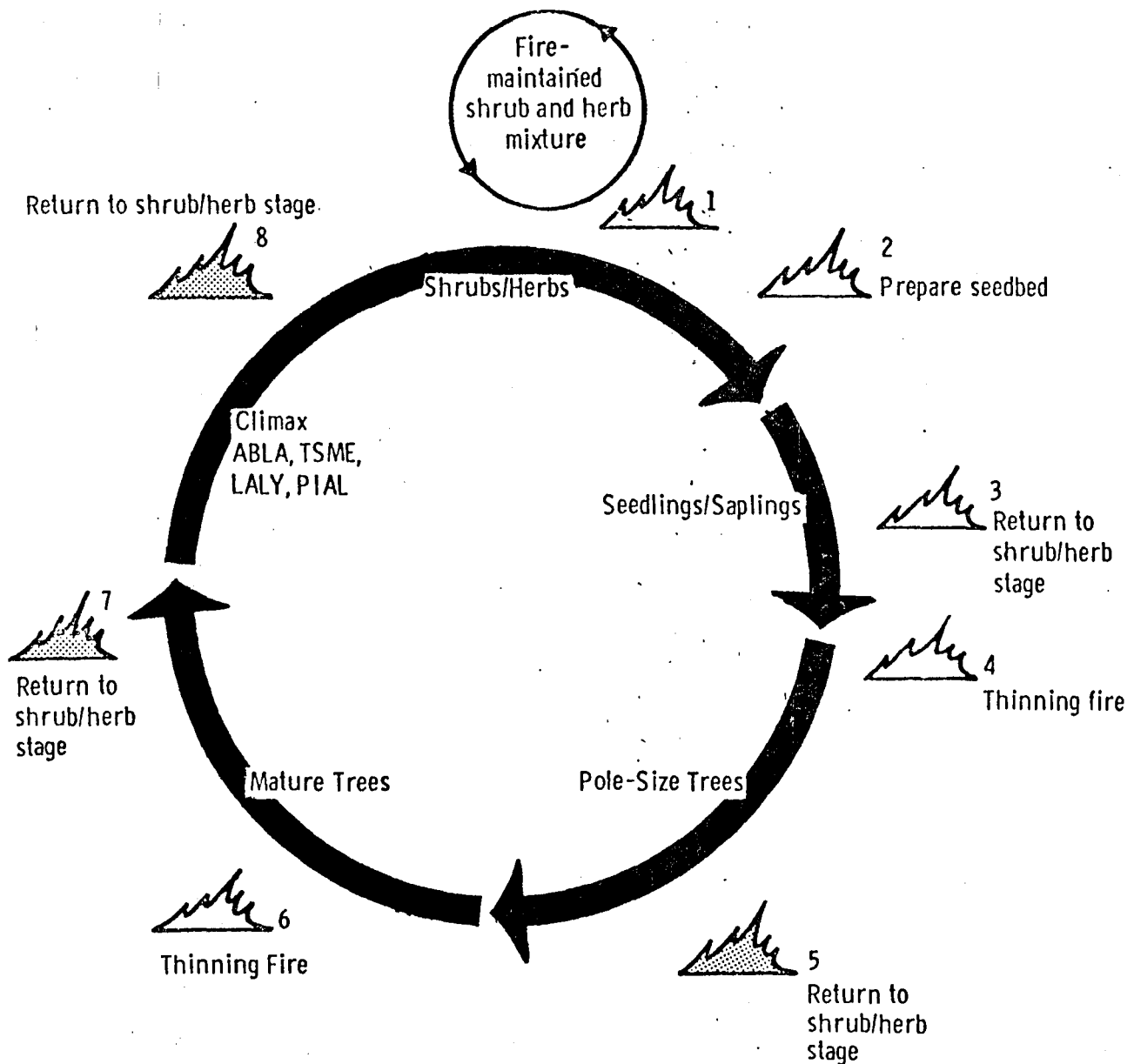


Legend :

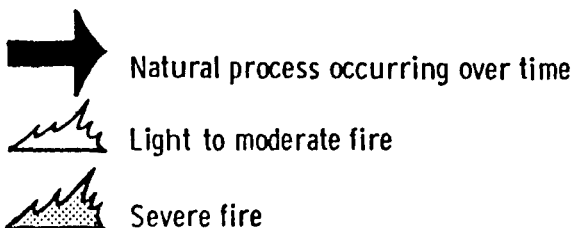
-  Natural process occurring over time
-  Light to moderate fire
-  Severe fire

- * Seral species vary with the habitat type. Generally they are lodgepole pine, Douglas-fir, western larch, and western white pine. Subalpine fir and spruce may occur in the seral stages of succession, but their representation will be limited by periodic fires.

Fire Group Six--upper subalpine and timberline habitat type.

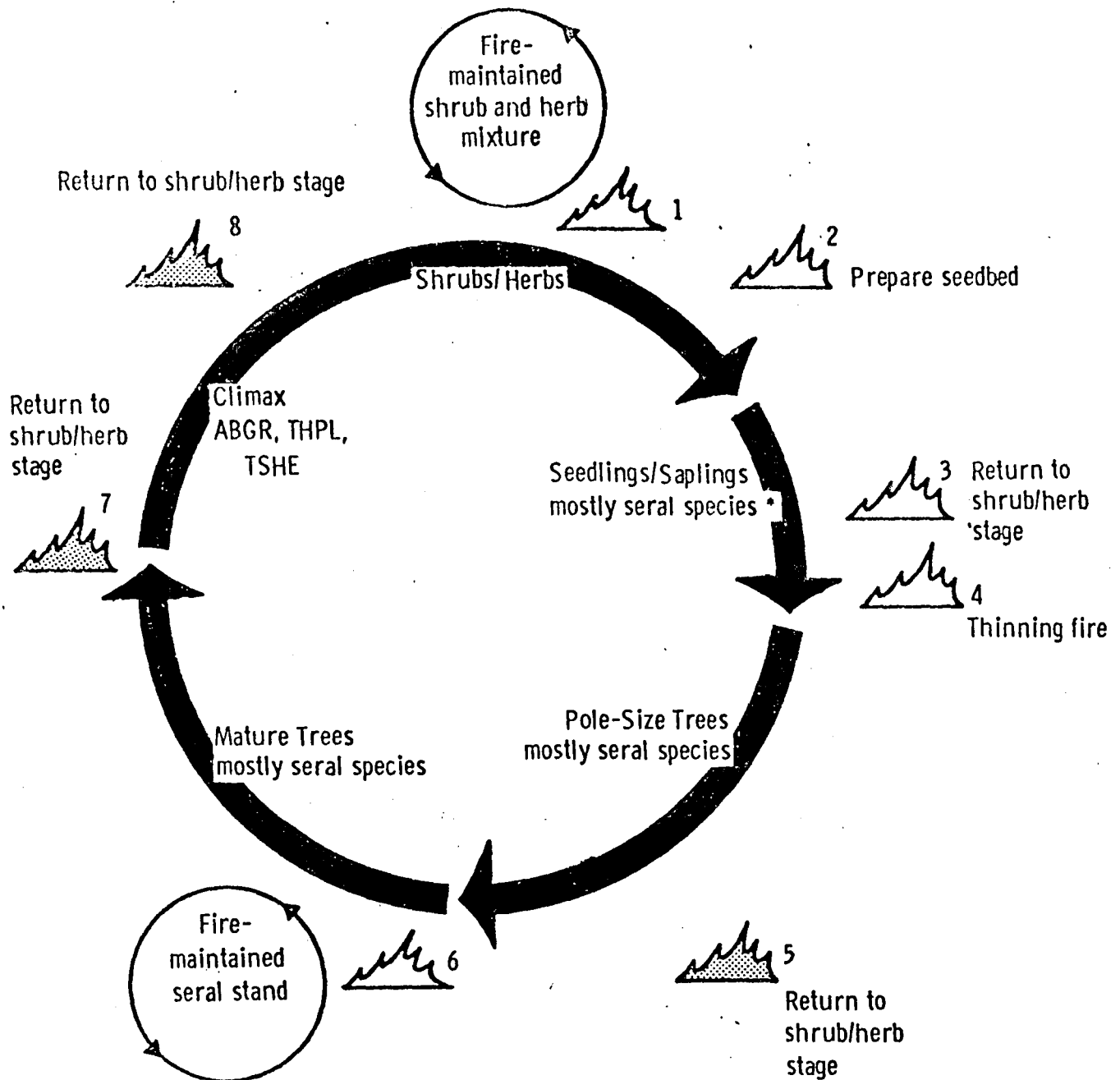


Legend:



- Seral species vary with the habitat type. Generally they are lodgepole pine, Douglas-fir, western larch, and western white pine. Whitebark pine and alpine larch may act as seral species. Subalpine fir and mountain hemlock may occur in the seral stages of succession, but their representation will be limited by periodic fires.

Fire Group Seven--grand fir, western redcedar, and western hemlock habitat types.



Legend:

-  Natural process occurring over time
-  Light to moderate fire
-  Severe fire

- * Seral species vary with the habitat type. Generally they are ponderosa pine, lodgepole pine, Douglas-fir, western larch, western white pine, subalpine fir, and spruce. Grand fir, western redcedar, and western hemlock may occur in seral stages, but their representation will be limited by periodic fires.

THE FIRE GROUPS

The eight Fire Groups defined in Davis et al. (Ms. in prep.) are:

Fire Group One. Warm, dry ponderosa pine habitat types. This group consists of open ponderosa pine stands with predominately grass undergrowth. These sites may exist as fire-maintained grasslands and do not support Douglas-fir. (This group is not found on the Troy District.)

Fire Group Two. Warm, dry Douglas-fir habitat types. These are areas which exist in nature as fire-maintained ponderosa pine stands that develop Douglas-fir regeneration beneath the pine in the absence of disturbance.

Fire Group Three. Cool, dry Douglas-fir habitat types. Group Three sites will support substantial amounts of Douglas-fir even when subjected to periodic natural fires.

Fire Group Four. Cool, moist habitat types usually dominated by lodgepole pine. This group includes stands in which fire maintains lodgepole as a dominant seral as well as those where it is a persistent dominant species.

Fire Group Five. Cold, wet lower subalpine habitat types. Group Five is a collection of upper elevation habitats in which fires are infrequent but severe, with long lasting effects.

Fire Group Six. Cold, upper subalpine and timberline habitat types. Group Six is a collection of high elevation habitats in which fires are infrequent. Small area fires are common because of the light, sparse fuels. Severe fires have a long termed effect.

Fire Group Seven. Warm, moist habitat types supporting grand fir, western hemlock, and western redcedar. These are moist habitats where fires are infrequent and often severe.

Fire Group Eight. The eighth group is a heterogenous collection of vegetation types which occur in the forest environment. These are scree, forested rock, meadow, grassy bald, and alder glade.

Fire Group Eight--Miscellaneous special vegetative types.

SCREE

Scree describes slopes covered with loose rock fragments. Often scree slopes are treeless, but those with finer rock can support open forest cover with sparse undergrowth. Species composition is extremely variable, with ponderosa pine, Douglas-fir, and subalpine fir all occasionally associated with scree.

The lack of fuel makes scree slopes almost unburnable. Individual trees or clumps of vegetation can ignite but fire spread is limited by the discontinuous vegetation development. Windswept crown fires could carry fire through this habitat, but, in actuality, scree slopes rarely burn.

Because of the lack of soil development, low site production, and low site moisture, revegetation of burned scree slopes would be slow.

FORESTED ROCK

Forested rock is a rock face or outcrop which supports some conifer (and possibly hardwood) trees with sparse undergrowth. Vegetation may grow in clumps or be scattered over the rock formation. Common tree species are ponderosa pine, Douglas-fir, and alder.

Ground fire poses little threat to the plant cover because the rock component limits fire spread and may even act as a fire break. Intense fires in adjoining, continuous forest may burn across the forested rock as spot-fires or windswept crown fires.

Revegetation is slow because of the lack of soil development, low site productivity, and low site moisture.

MEADOW

Meadow vegetation is herbaceous matter which grows on sites that are sub-irrigated part or all of the growing season. Consequently, meadows are not readily burnable. In fact, their succulent vegetation may act as fire breaks to moderately intense fires. If these habitats dry out late in the growing season, however, they become more flammable.

Fire may reduce meadow vegetation to ground level, but species which are capable of resprouting will be little damaged. Naturally occurring fire has had a role in maintaining meadows. Fire suppression has allowed conifers to invade many of these habitats.

GRASSY BALD

These are grassy openings interspersed among continuous forest. The importance of fire to grassy balds is twofold. First, if the balds are green, they can act as fire breaks. Second, if the grass is cured, then windswept fire can quickly burn across the opening into heavier fuels within the forest. In this manner, the readily ignitable, fine herbaceous fuels hamper fire suppression by augmenting fire spread.

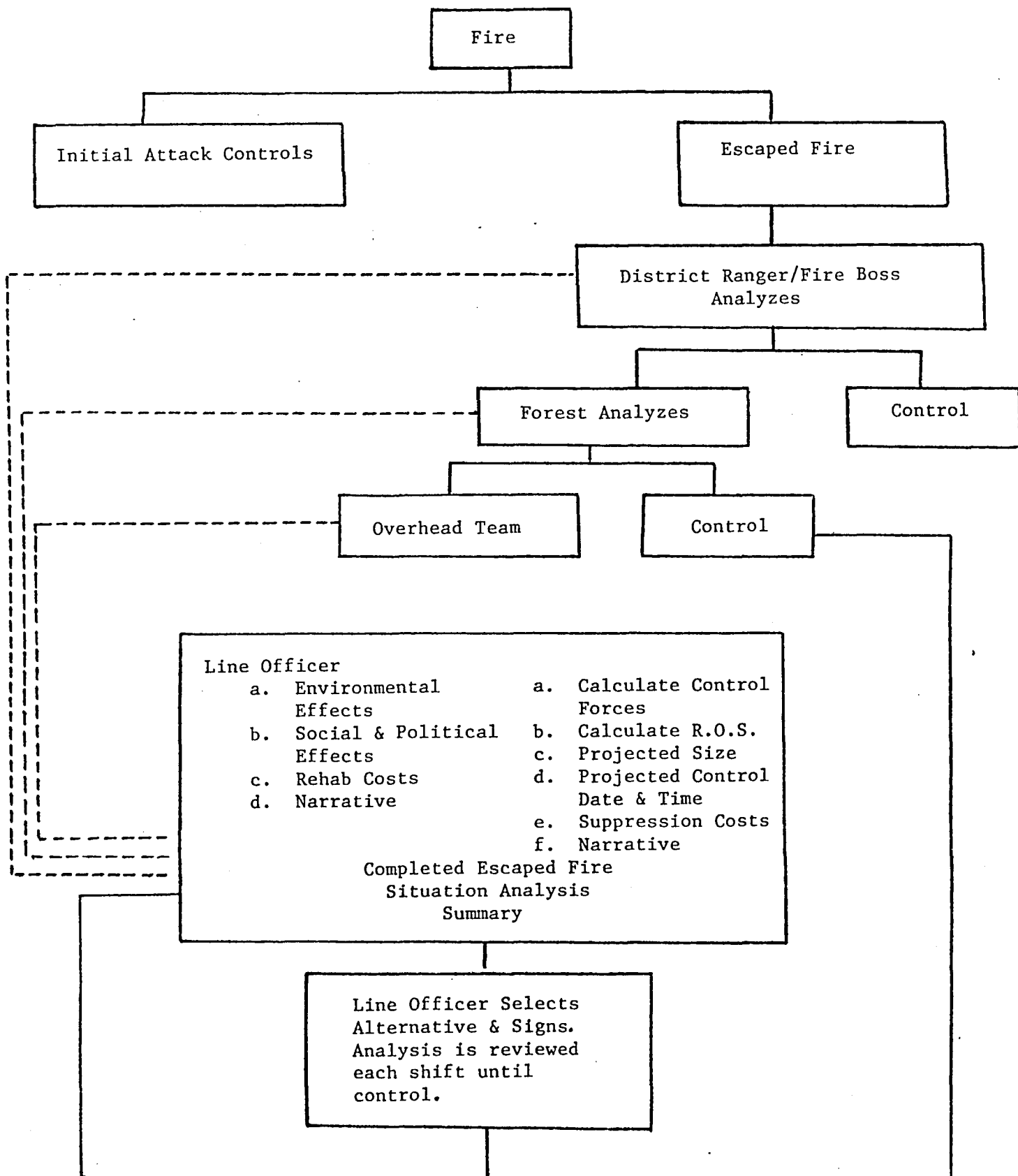
This habitat is relatively unharmed by fire because the herbaceous vegetation resprouts readily. In fact, grassy balds would benefit from the nutrient increase from ash and removal of decadent foliage. Fire may also be a factor which keeps conifer regeneration from invading grass openings.

ALDER GLADE

An alder glade is an opening in the forest which is vegetated by *Alnus*. The site is usually a mesic location which is too wet for associated conifers. Alder is moderately fire resistant because of its non-flammable bark and non-resinous leaves. Resistance is further enhanced when *Alnus* grows in thickets because the duff is cool and moist and the undergrowth is sparse. In addition, its occurrence on mesic sites reduces vulnerability to fire.

Alder glades probably burn infrequently but intensely. Fire promotes dense stands because it stimulates resprouting. Like aspen, alder stands may be maintained by fire.

APPENDIX D. Escaped fire situation analysis.



USDA - FOREST SERVICE - NORTHERN REGION ESCAPED FIRE SITUATION ANALYSIS (see instructions on reverse)	1. Fire Name		2. Date _____ Time _____ Workshift Day Night	
	3. Region	4. Forest	5. District	

6. LAND MANAGEMENT OBJECTIVES:

	Existing Situation	Alternatives											
		A			B			C			D		
7. SITUATION													
a. Estimated size at control (acres) _____													
b. Anticipated control date and time _____													
c. Probability of control success (%) _____													
d. Anticipated fire behavior (low to extreme) _____													
8. ECONOMIC EFFECTS													
a. Suppression cost through mopup (\$) _____													
b. Rehabilitation costs (\$) _____													
c. Improvement replacement costs (\$) _____													
9. ENVIRONMENTAL <u>1/</u>		-	+	0	-	+	0	-	+	0	-	+	0
a. Air quality _____													
b. Wildlife _____													
c. Fisheries _____													
d. Visual _____													
e. Timber _____													
f. Range _____													
g. Recreation _____													
h. Watershed _____													
i. Cultural resources _____													
j. Soils _____													
10. SOCIAL OR PUBLIC EFFECTS <u>1/</u>													
a. Public concern _____													
b. Public safety _____													
c. Firefighter safety _____													
d. Impacts on other agencies and private values _____													

1/A numerical rating of 1 to 5 should be used to indicate relative significance of a particular element. Rate effect on each element under each alternative. For example:
 - Damage (unfavorable change), + Benefit (favorable change), 0 No effect.

ALTERNATIVE SELECTED _____ AND WHY?

Line Officer: _____ Date: _____ Time: _____
 Name
 Title: _____
 (over)

REMARKS:

The objective of fire suppression is to confine or control each wildfire at a reasonable cost so that land management objectives may be met. (FSM 5130.2 and .3)

An Escaped Fire is defined as a fire that exceeds the first calculation of initial attack resources and reasonable reinforcements necessary for prompt control, or exceeds its fire prescription (the prescription included in RF approved fire management area plan).

INSTRUCTIONS FOR USE OF ESCAPED FIRE ANALYSIS

1. When the fire is a District responsibility, District personnel will complete the analysis.
2. If the fire becomes a Forest responsibility, the analysis will be made by the Forest Supervisor and/or fire team.
3. A sketch of projected fire perimeter and a brief narrative of each alternative will be included with the analysis.
4. For land management objectives briefly state broad objectives and/or land allocation. Such as timber production, wildlife, etc.
5. Reference Fireline Handbook 70.1-1 and 2 and Fire Business Management Handbook section 930 for costs.
6. The Line Officer must weigh the various factors (land management objectives, situation, economic, environmental, social and political effects) and select an alternative which develops a suppression action commensurate with the values.
7. The analysis must be reviewed during each shift and a new analysis made, if necessary, to reflect changed conditions.
8. Retain this report with fire records.

APPENDIX E. Discussion of energy release component and burning index information from 1967 through 1977 for Troy, Montana (B=daily; . = 3-day running mean).

A. Energy Release Component

A summary of the daily ERC values for Fuel Model G for each fire season from 1967 through 1977, June through October, is presented in table 1. ERC will be discussed in relation to the 30 and 53 values. Thirty ERC was the average low during the regular fire season (June 1 to September 15). This value was selected as representing the threshold of fuel moisture conditions between the regular fire season and the pre- and post-fire seasons. Fifty-three ERC is the value at the 80 percentile level (based on the 11-year summary). The 80 percentile level represents the upper limits of fire containment. Noted historical stand-destroying fires (1910, 1929, 1967) have occurred when the ERC was above the 80 percentile level.

Table 1 shows that in the beginning of the fire season, the ERC was between 19 and 32 during the 11 year period. It gradually rose, but rain caused it to fluctuate sometimes significantly. By the third week of June, it was often greater than 30 and remained so for an average of at least three months.

The ERC usually reached 53 in July. However, rain and low temperatures kept the ERC below 53 in 1972, 1974, 1975, 1976, and 1977. Peak values in these years ranged between 43 and 52. In the remaining six years, the ERC stayed above 53 for an average of one and one-third months.

The high values recorded during each season were short term, typically lasting two weeks. Peak values during the 11 years ranged between 43 and 77 and usually happened in late July or mid-August. Peak values were one-day occurrences.

The seasonal trend shows a decline in late August or early September. This was followed by an immediate increase which peaked out usually at a lower value than the first peak. A decline followed but the record period ended before the ERC reached a steady state.

In summary, the ERC is around 25 at the beginning of the record period. It gradually increases throughout June and July until the peak value is reached in late July or mid-August. On the average, ERC stays above 30 at least three months and above 53 for one and one-third months. In five years the fire danger did not rise above 53 ERC. A decline followed by a second rise occurs in late August or early September. This activity represents the "Indian Summer" period in the autumn months.

The ERC curves for each year from 1967 through 1977 are presented in figures 1 to 11 following the discussion. Table 1 summarizes the information presented in the curves. An example of interpreting the curve is given with the 1967 ERC. In 1967, the ERC was 25 at the beginning of the record period, June 5. ERC rose above 30 on June 14 and stayed there for the record period. From August 24 to

Table 1

Energy Release Component (ERC) for Fuel Model G from 1967 through 1977,
Troy, Montana, (Daily Values)

<u>Year</u>	<u>First Peak</u>				<u>Second Peak</u>		
	<u>Start</u>	<u>>30*</u>	<u>>53*</u>	<u>Peak</u>	<u>Start</u>	<u>Peak</u>	<u>End+</u>
1967	25 (6/5)#	(6/14-10/11) 4 mo.	(8/24-9/30) 1-1/4 mo.	64 (9/22)	34 (10/3)	48 (10/8)	34 (10/11)
1968	28 (6/6)	(6/15-9/19) 3 mo.	(7/24-8/13) 3 wks.	60 (8/8)	31 (8/14)	56 (9/2)	39 (9/19)
1969	30 (6/5)	(6/5-9/28) 3-3/4 mo.	(7/26-9/18) 1-3/4 mo.	67 (8/26)	29 (9/22)	46 (9/27)	40 (9/28)
1970	30 (6/17)	(6/17-10/8) 3-3/4 mo.	(7/3-9/16) 2-1/2 mo.	73 (7/23)	36 (9/22)	52 (10/4)	26 (10/8)
1971	31 (6/3)	(6/15-9/28) 3-1/2 mo.	(7/16-8/30) 1-1/2 mo.	77 (8/15)	30 (9/6)	61 (9/18)	39 (9/28)
1972	25 (6/3)	(6/29-9/8) 2-1/2 mo.	N/A	52 (8/7)	40 (8/19)	46 (8/30)	41 (9/8)
1973	26 (6/3)	(6/20-8/5) 1-1/2 mo.	(7/3-8/4) 1 mo.	55 (8/22)	17 (8/31)	39 (9/15)	35 (9/18)
1974	32 (6/3)	(6/11-9/9) 3 mo.	N/A	43 (8/6)	17 (9/9)	36 (9/28)	36 (9/28)
1975	19 (6/17)	(6/3-8/23) 2-3/4 mo.	N/A	43 (8/8)	8 (8/29)	30 (9/6)	25 (9/28)
1976	24 (6/3)	(7/15-8/6) 3 wks.	N/A	44 (7/27)	0 (8/25)	25 (9/5)	25 (9/28)
1977	27 (6/3)	(6/21-8/24) 2 mo.	N/A	44 (7/15)	2 (8/29)	20 (9/14)	20 (9/14)

#25 (6/5) represents an ERC of 25 on June 5, the beginning of the record period.

*The period >30 ERC begins when the value remains above 30 for five consecutive days and ends when it stays below 30 for five consecutive days. The same applies to >53 ERC.

+End of the record period.

September 30, the ERC was above 53, the 80 percentile level. The peak value was 64 on September 22. The second rise (Indian Summer) occurred from October 3 to 11. The peak value during this time was 48 on October 8. Table 1 corresponds in the same manner to the curves from 1968 through 1977.

Figure 12 shows the curves of the three day running means for the lowest, average, and highest values recorded for the 11-year period. In essence the curves show the lowest and highest ERC values which can be expected in any year based on the 11-year record. The average is calculated from the low and high values and represents the average condition which may be expected for a fire season. Low ERC values fluctuated widely but usually remained below 30 ERC, except towards the end of the fire season when fuel moisture was low. The average ERC curve climbed quickly and remained above 30 nearly the entire record period. The 80 percentile level was never reached since 50 ERC was the peak value. The highest ERC values were above 30 the entire fire season. For approximately three months, ERC was greater than 53. The second peak period (Indian Summer) is evident on all the curves for three day running means.

The frequency distribution for the 11-year summary of ERC is shown in figure 13. The cumulative frequency curve is plotted in figure 14. On 90 percent of the days (1136 days) for the 11-year period, the ERC was 60.56 or less; 97 percent of the days (1224 days) had an ERC of 68.92 or less. The cumulative frequencies for 30 and 53 ERC are less than or equal to 26 percent and 80 percent, respectively.

B. Burning Index

Table 2 is a summary of the daily BI values for Fuel Model G for each fire season from 1967 through 1977. BI in the beginning of June was usually above 28. Then it gradually climbed, although sometimes noticeably dropping before staying over 28. It typically reached 28 by the third week of June and stayed above it for an average of three months.

BI climbed to 38 by the last week of June or early July and remained above 38 for an average of two months during the 11-year period. During two years BI did not climb above 38, and in two other years it remained above 38 only for one week.

The peak indices were between 49 and 116 usually in August. They lasted less than a week, often just one day. However, consecutively high readings (above 55) were reported for two weeks to a month during some years (1967-1971). The index rose to 78 or above 12 times during the 11-year record but only for one day periods. Three times a BI of 116 occurred for a one day period, marking the only occasions the BI rose above 92.

The seasonal BI curves characteristically showed a decline in late August or early September followed by an immediate climb. A falling trend was indicated after the rise but the record period ended in

Table 2

Burning Index (BI) for Fuel Model G from 1967 through 1977,
Troy, Montana, (Daily Values)

Year	First Peak				Second Peak		
	Start	>28*	>38*	Peak	Start	Peak	End+
1967	33 (6/2)#	(6/14-10/11) 4 mo.	(7/14-10/11) 3 mo.	78 (9/29)	0 (10/1)	47 (10/9)	29 (10/11)
1968	31 (6/6)	(6/6-9/19) 3-1/2 mo.	(6/18-9/19) 3 mo.	80 (8/8)	0 (8/11)	62 (9/10)	50 (9/19)
1969	44 (6/5)	(6/5-9/28) 3-3/4 mo.	(7/10-9/28) 3 mo.	88 (8/24)	0 (9/19)	56 (9/24)	36 (9/28)
1970	34 (6/17)	(6/17-10/8) 3-3/4 mo.	(6/22-10/8) 3-1/2 mo.	82 (8/17) 86 (8/25) 116 (10/4)	30 (9/22)	116 (10/4)	17 (10/8)
1971	38 (6/3)	(6/3-9/28) 4 mo.	(6/22-9/28) 3 mo.	116 (6/22)	0 (9/1)	61 (9/13)	42 (9/28)
1972	33 (6/3)	(6/28-9/8) 2-1/4 mo.	(8/5-9/8) 1 mo.	57 (8/12)	0 (9/6)	N/A	0 (9/8)
1973	32 (6/3)	(6/20-9/18) 3 mo.	(6/30-9/18) 2-1/2 mo.	65 (7/28) 65 (8/17)	17 (8/30)	44 (9/11)	38 (9/18)
1974	42 (6/3)	(6/3-9/28) 4 mo.	N/A	61 (8/6)	0 (9/9)	45 (9/28)	45 (9/28)
1975	23 (6/17)	(7/9-8/16) 1-1/4 mo.	(8/7-8/16) 1 wk.	56 (8/10)	0 (8/16)	37 (8/22)	25 (9/28)
1976	26 (6/3)	(6/3-8/4) 2 mo.	(7/24-7/28) 1 wk.	49 (7/26)	8 (8/15)	24 (9/5)	23 (9/28)
1977	37 (6/3)	(6/22-8/24) 2 mo.	N/A	51 (7/12)	0 (8/24)	24 (9/14)	24 (9/14)

#33 (6/2) represents a BI of 33 on June 2, the beginning of the record period.

*The period >28 BI begins when the number remains above 28 for five consecutive days and ends when it stays below 28 for five consecutive days. The same applies to >38 BI.

+End of the record period.

late September or early October before the BI reached a steady low value.

In summary, the BI is between 25 and 45 at the beginning of the record period in June. It gradually climbs to a peak index in August or September. High values occurred for a two week period from mid-August to mid-September. The records indicated an average of 60 BI at this time. An interpolation of BI 60 gives a fireline intensity of 385 BTU/sq. ft. and flame length of 6.0 ft. (1.8 m). In early September, the index declines then climbs again. By the end of the record period, a gradual decline is evident. This last activity is a reflection of "Indian Summer" weather.

The BI curves for 1967 through 1977 are shown in figures 15 through 25. Table 2 summarizes the information in the curves for each of the 11 years. An example of interpreting the curve is given with the 1967 BI. In 1967, the BI was 33 on June 2, the beginning of the record period. It rose above 28 on June 14 and except for three days remained above 28 for the record period. After July 14, it stayed above 38 until October. The peak BI was 79 on September 29. The second rise, or "Indian Summer", occurred from October 1 until the record ended on October 11. The peak was 47 on October 9. The information from table 2 corresponds in the same manner to the BI curves from 1968 through 1977.

Figure 26 shows the curves of the three day running means for the lowest, average, and highest values recorded for the 11-year period. The curves illustrate the lowest and highest BI values which can be expected in any year based on the 11 year summary. The average is determined from the low and high values and represents the average condition which can be expected during a fire season. Low BI values fluctuated widely but usually remained below 28. The greatest values occurred late in the fire season. The average mean started relatively high, dropped, and then gradually climbed until mid-August. It stayed above 38 BI for most of three months. The highest BI values were greater than 38 for most of the fire season. On occasion, BI was above 78 for a few days. The second peak period (Indian Summer) is apparent in all three curves.

Figure 27 is the frequency distribution for the 11-year summary of BI. The cumulative frequency is plotted in figure 28. The 11-year period entails 1263 days of records. Ninety percent of the days (1136 days) had a BI of 59 or less, and 97 percent (1224 days) had a value of 68 or less. The cumulative frequencies of the critical fireline intensities according to Deeming *et al.* (1977) are shown below:

<u>Burning Index</u>	<u>Cumulative Frequency</u>
28	≤ 26.5%
38	≤ 54.2%
78	≤ 99.3%
92	≤ 99.8%
108	≤ 100.0%

Figure 1. Energy release component---1967 (B=daily; •=3 day running mean).

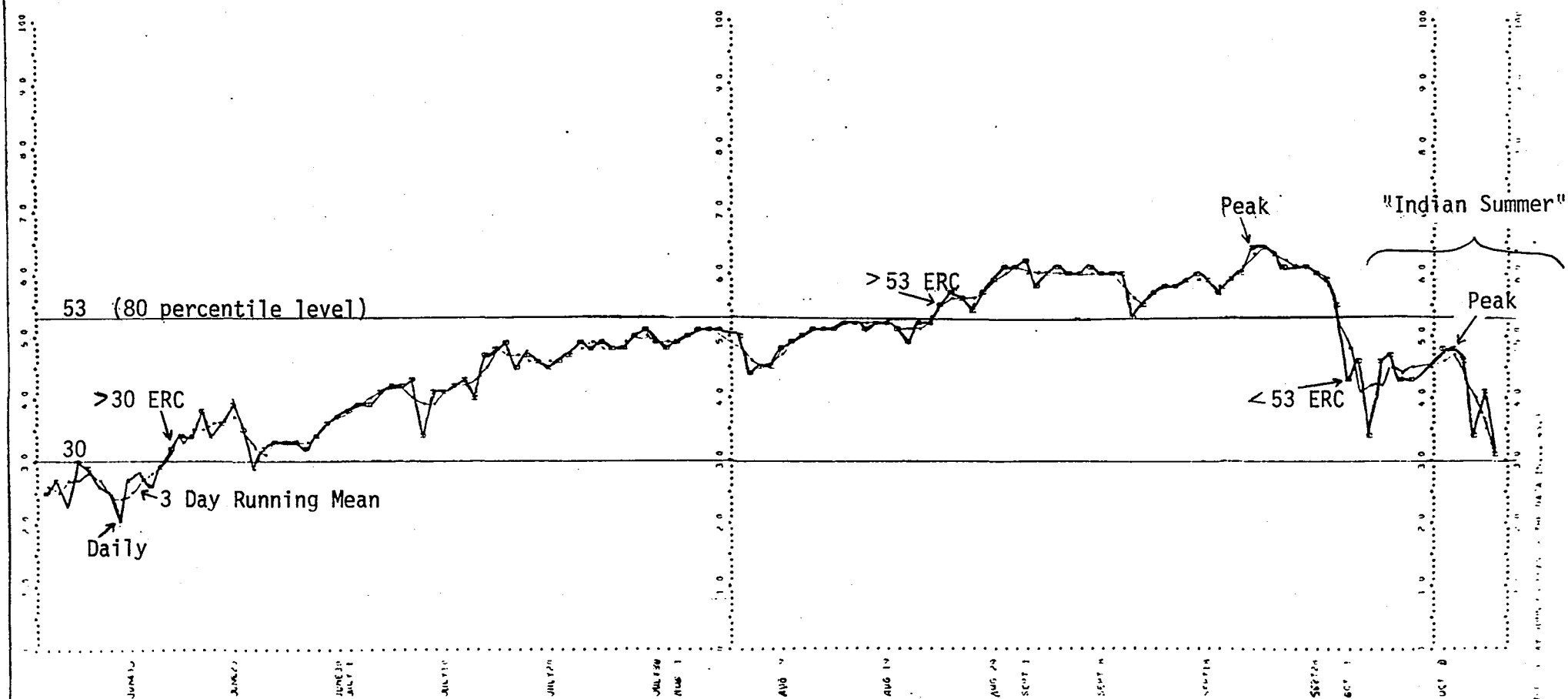


Figure 2. Energy release component---1968.

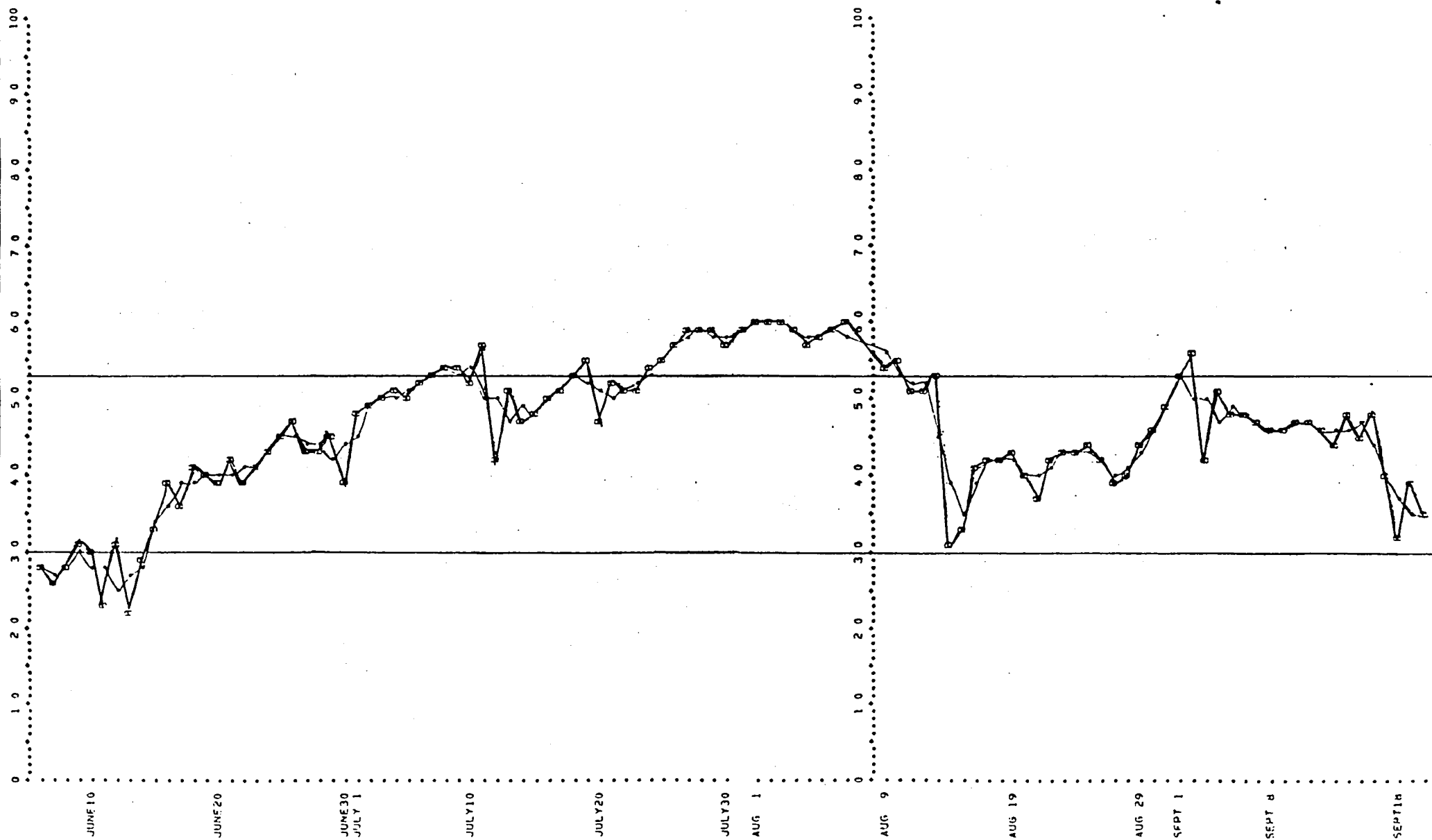


Figure 3. Energy release component---1969.

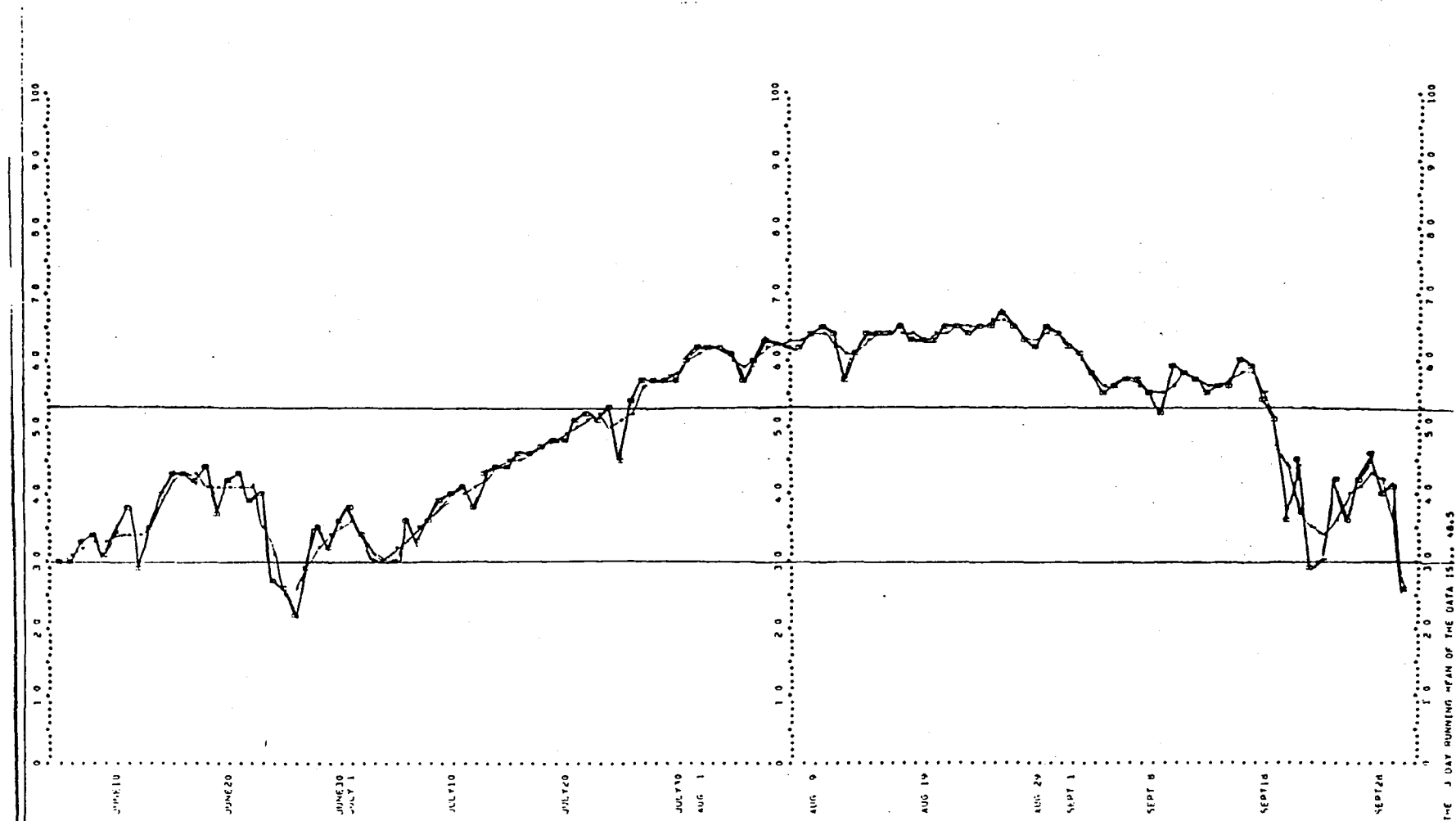


Figure 4. Energy release component---1970.

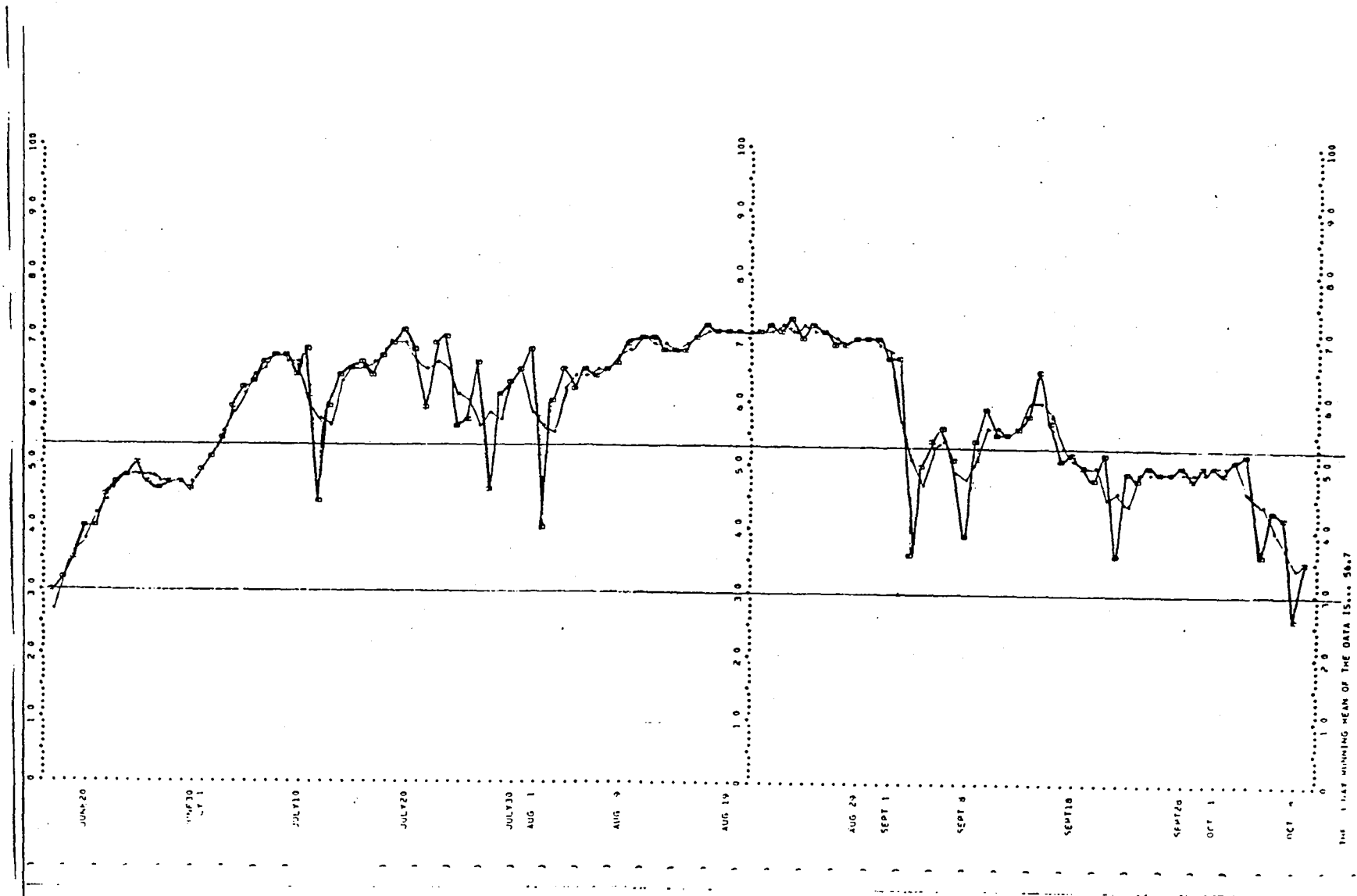
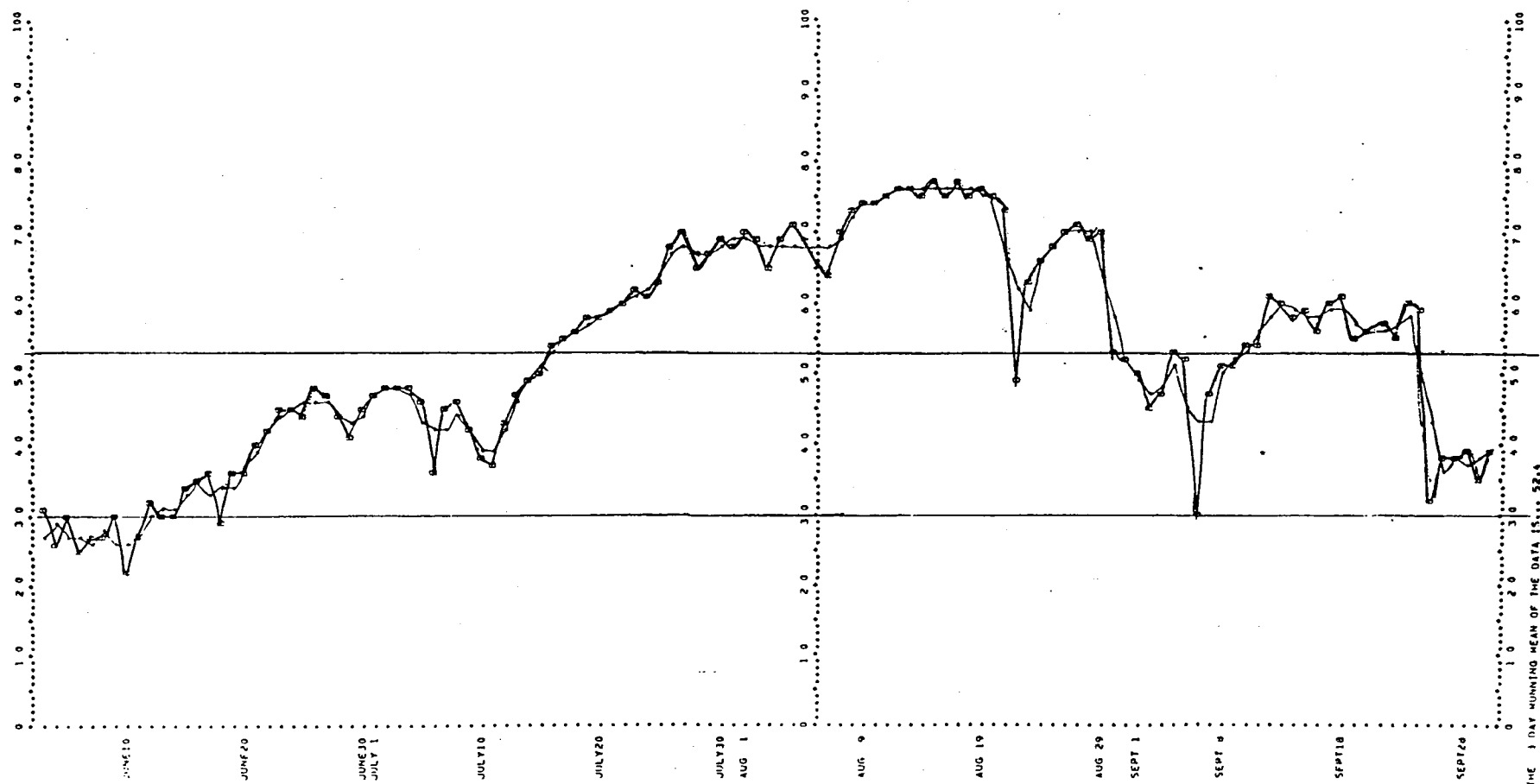


Figure 5. Energy release component---1971.



THE 3 DAY RUNNING MEAN OF THE DATA IS... 52.4

Figure 1. Energy release component---1967 (B=daily; •=3 day running mean).

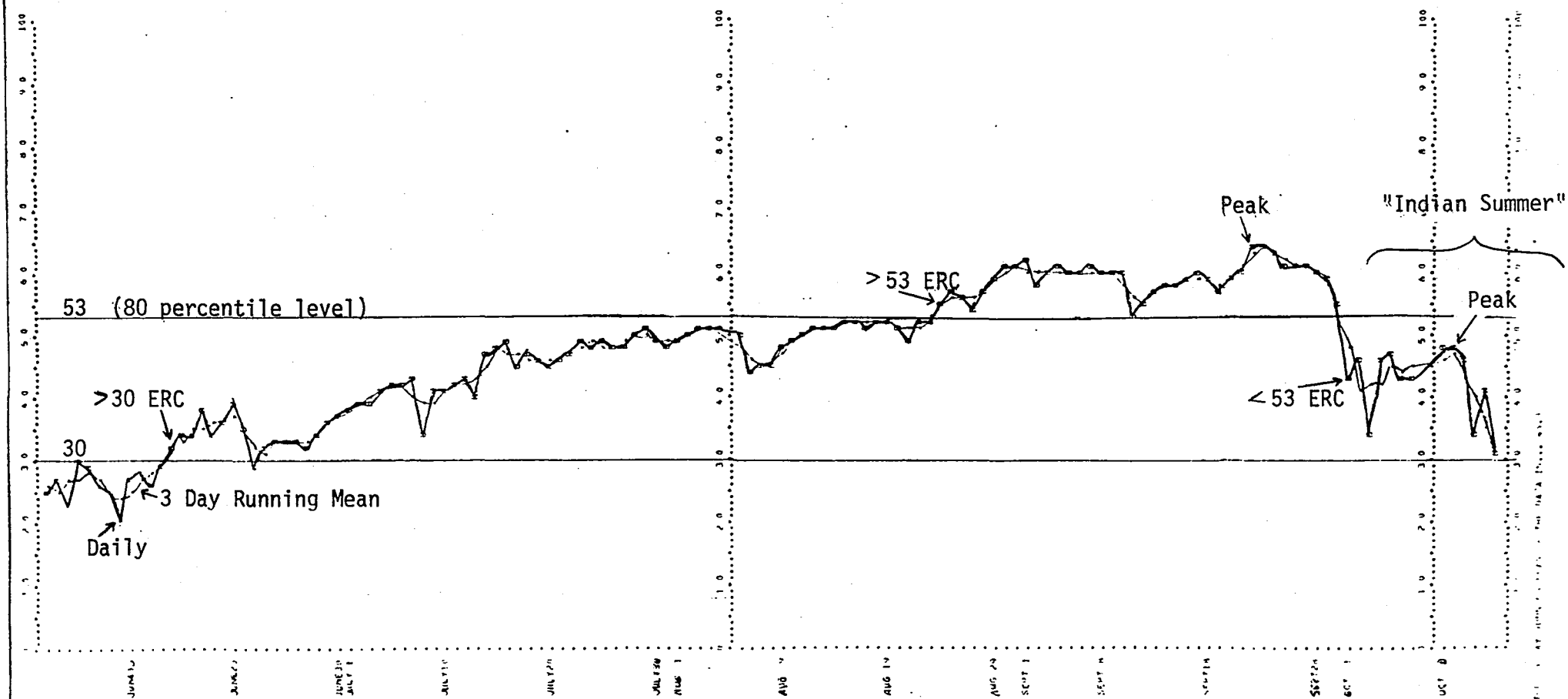


Figure 2. Energy release component---1968.

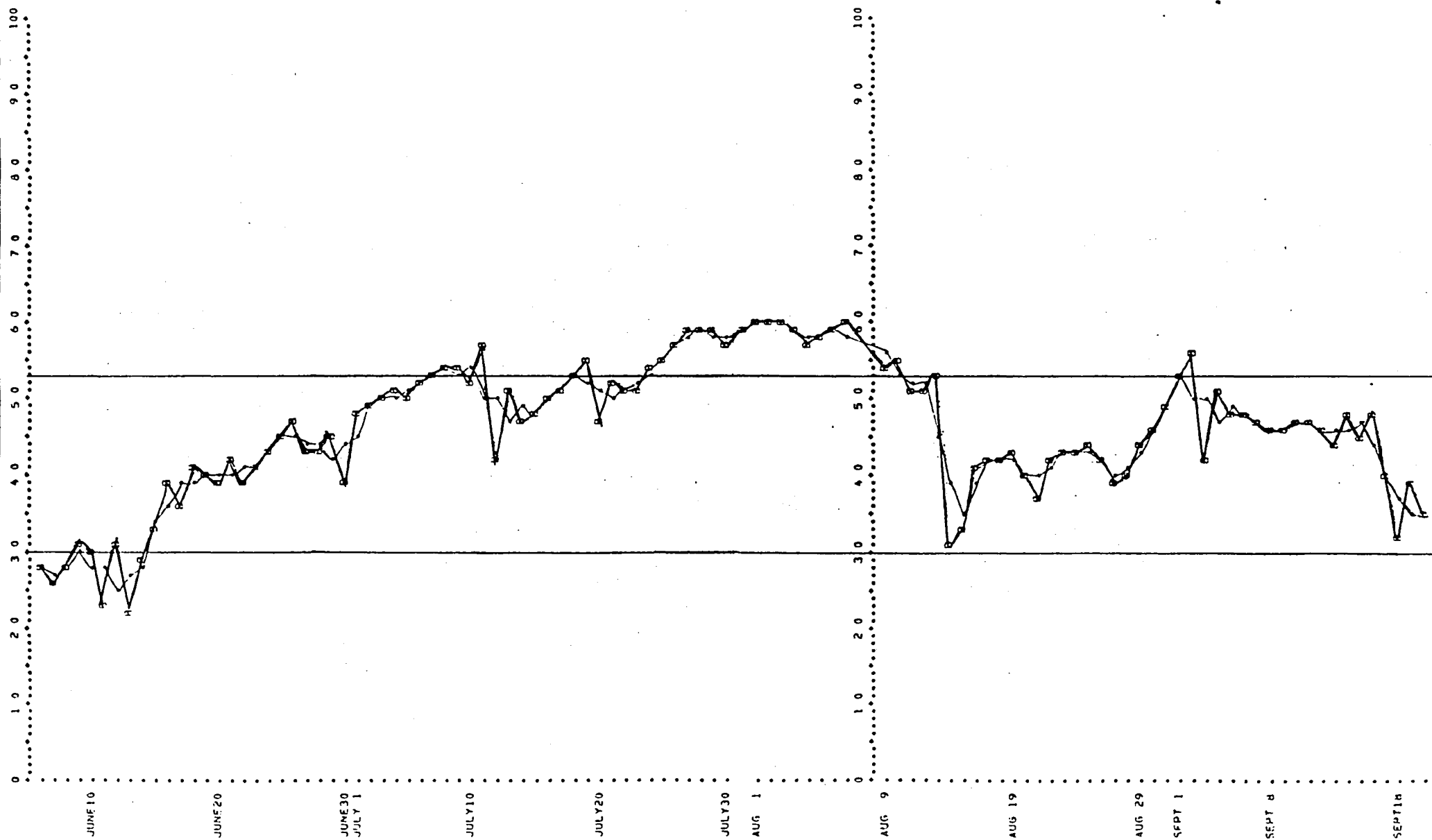
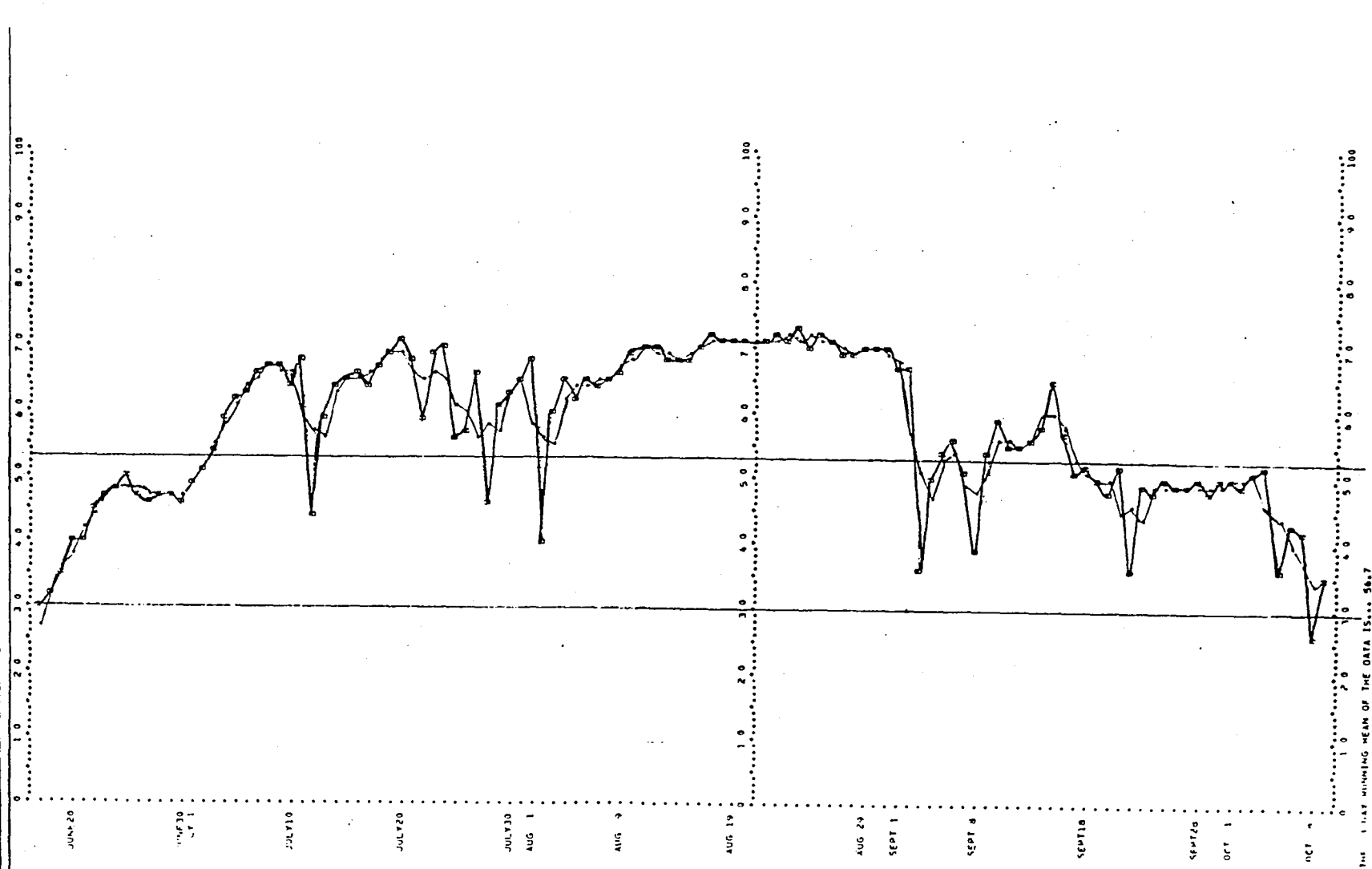
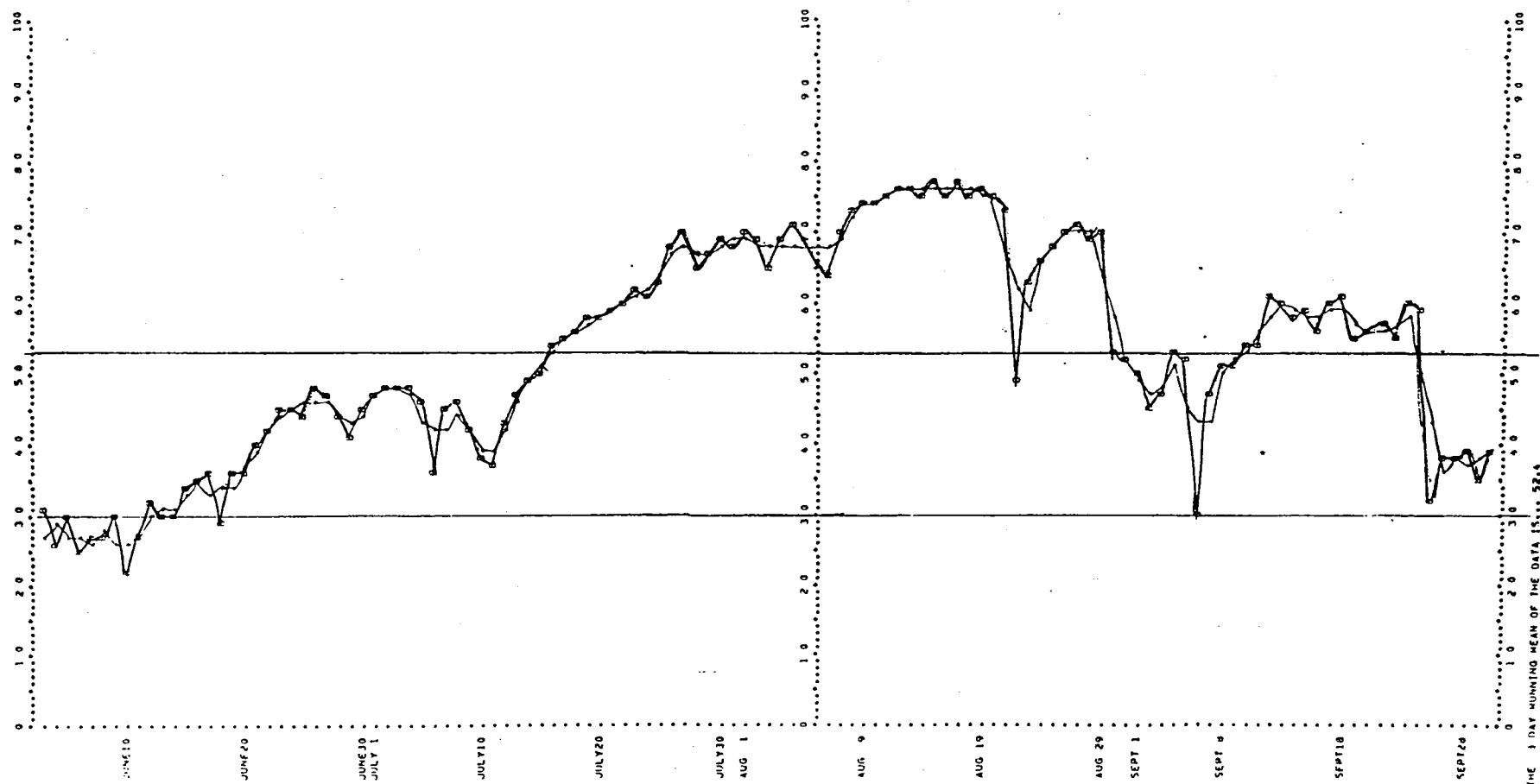


Figure 4. Energy release component---1970.



THE 1 DAY RUNNING MEAN OF THE DATA IS... 56.7

Figure 5. Energy release component---1971.



THE 3 DAY RUNNING MEAN OF THE DATA IS... 52.4

Figure 6. Energy release component---1972.

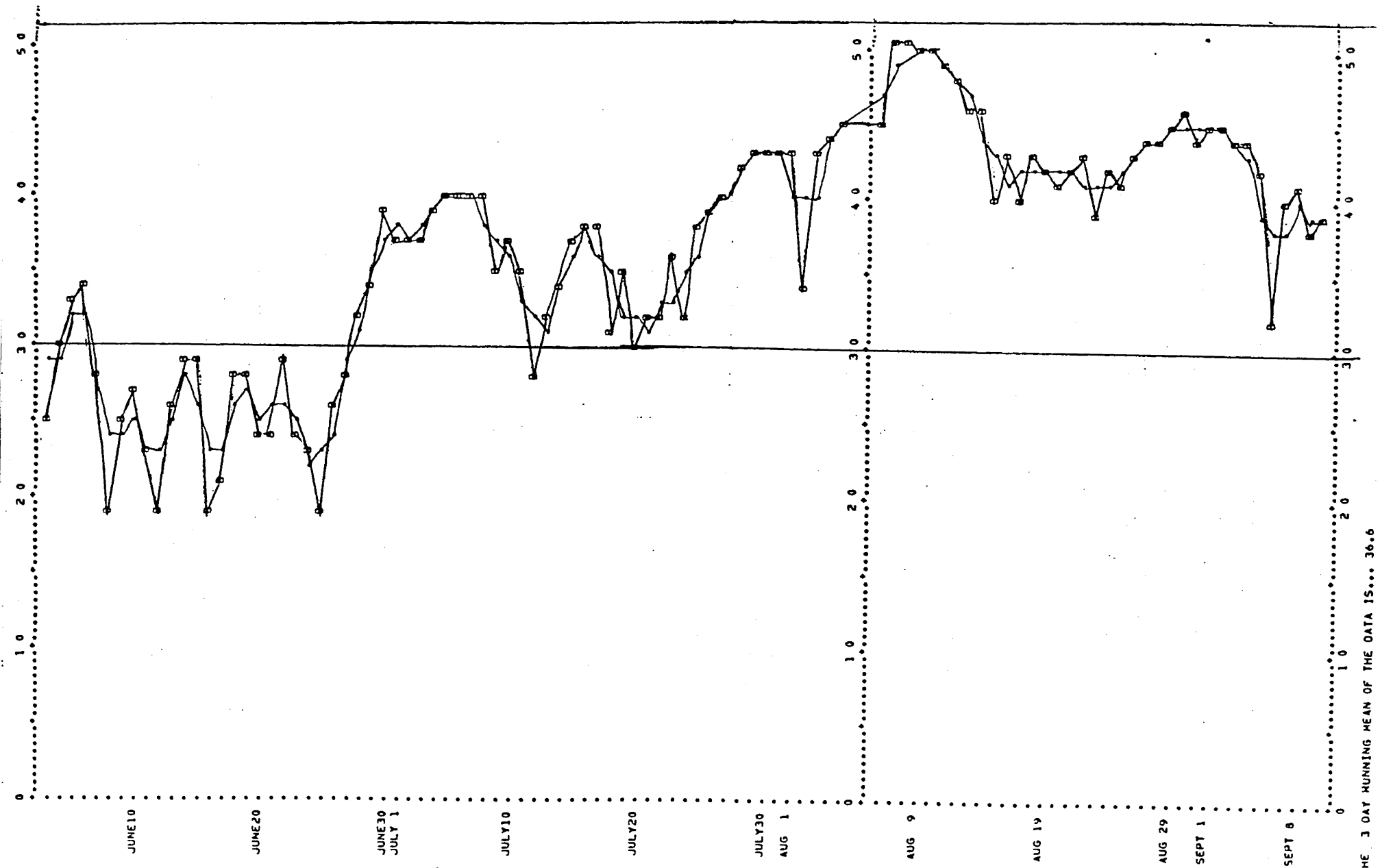


Figure 6. Energy release component---1972.

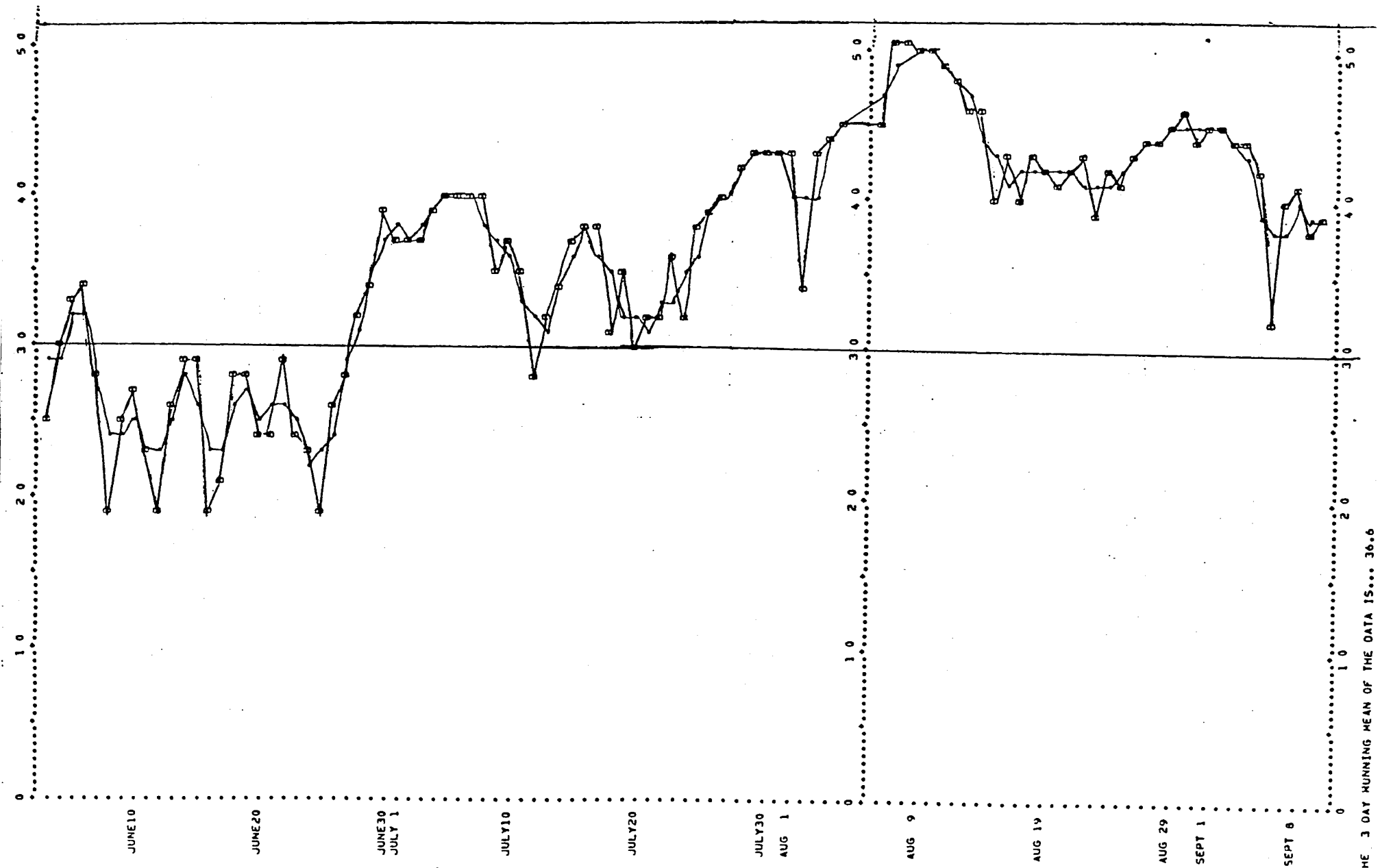


Figure 7. Energy release component---1973.

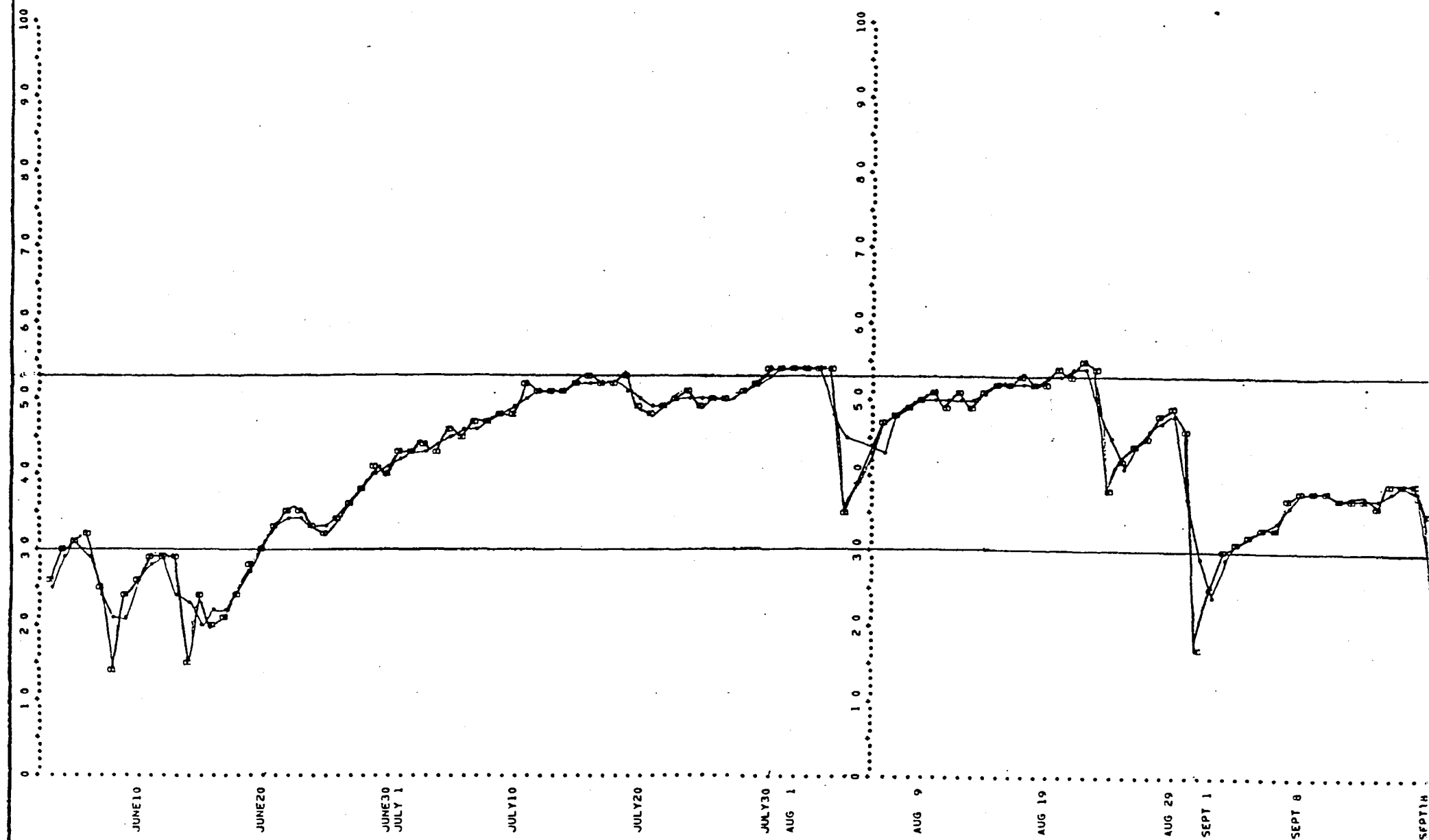
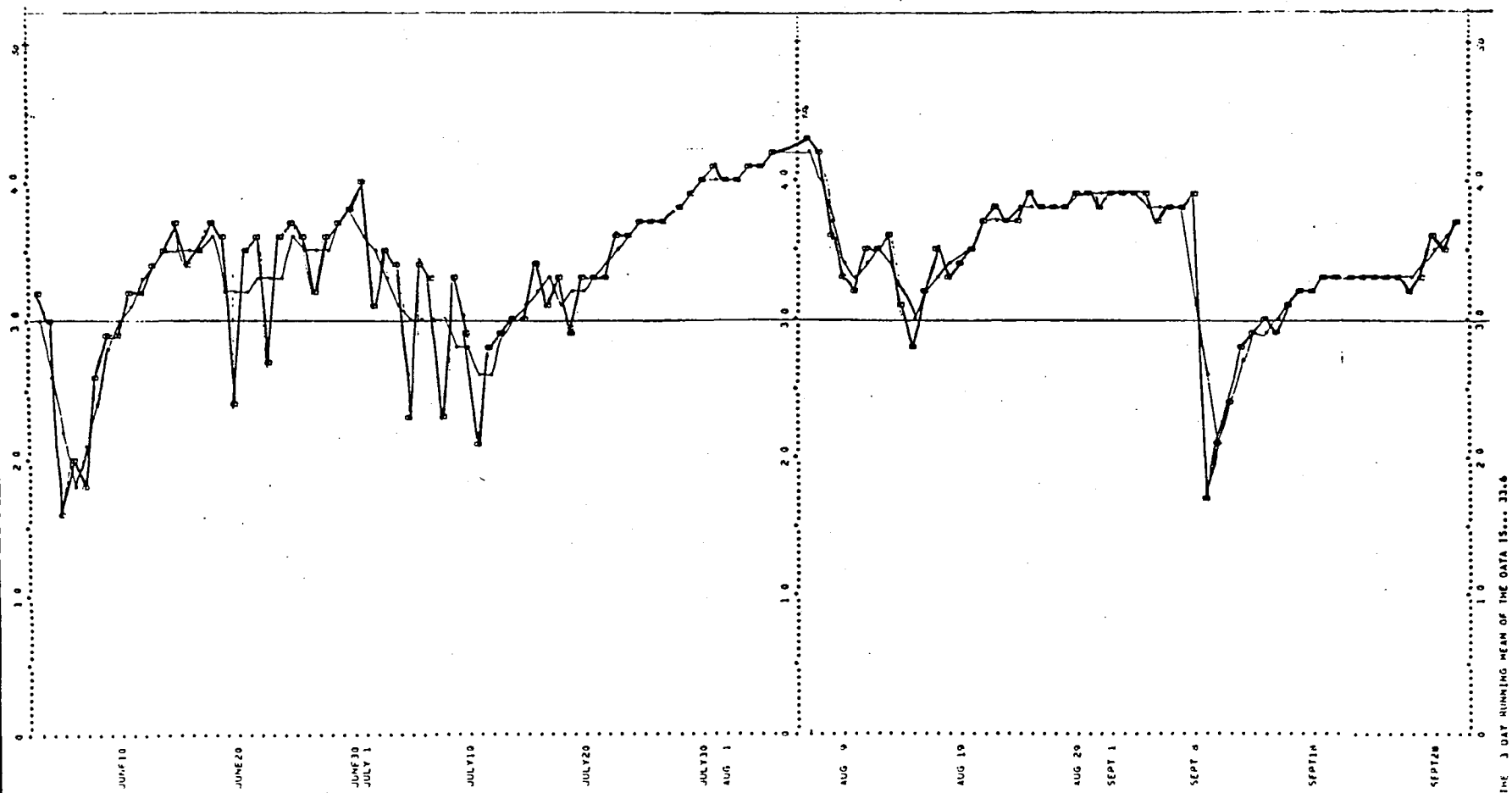


Figure 8. Energy release component---1974.



THE 3 DAY RUNNING MEAN OF THE DATA IS... 33.6

Figure 9. Energy release component---1975.

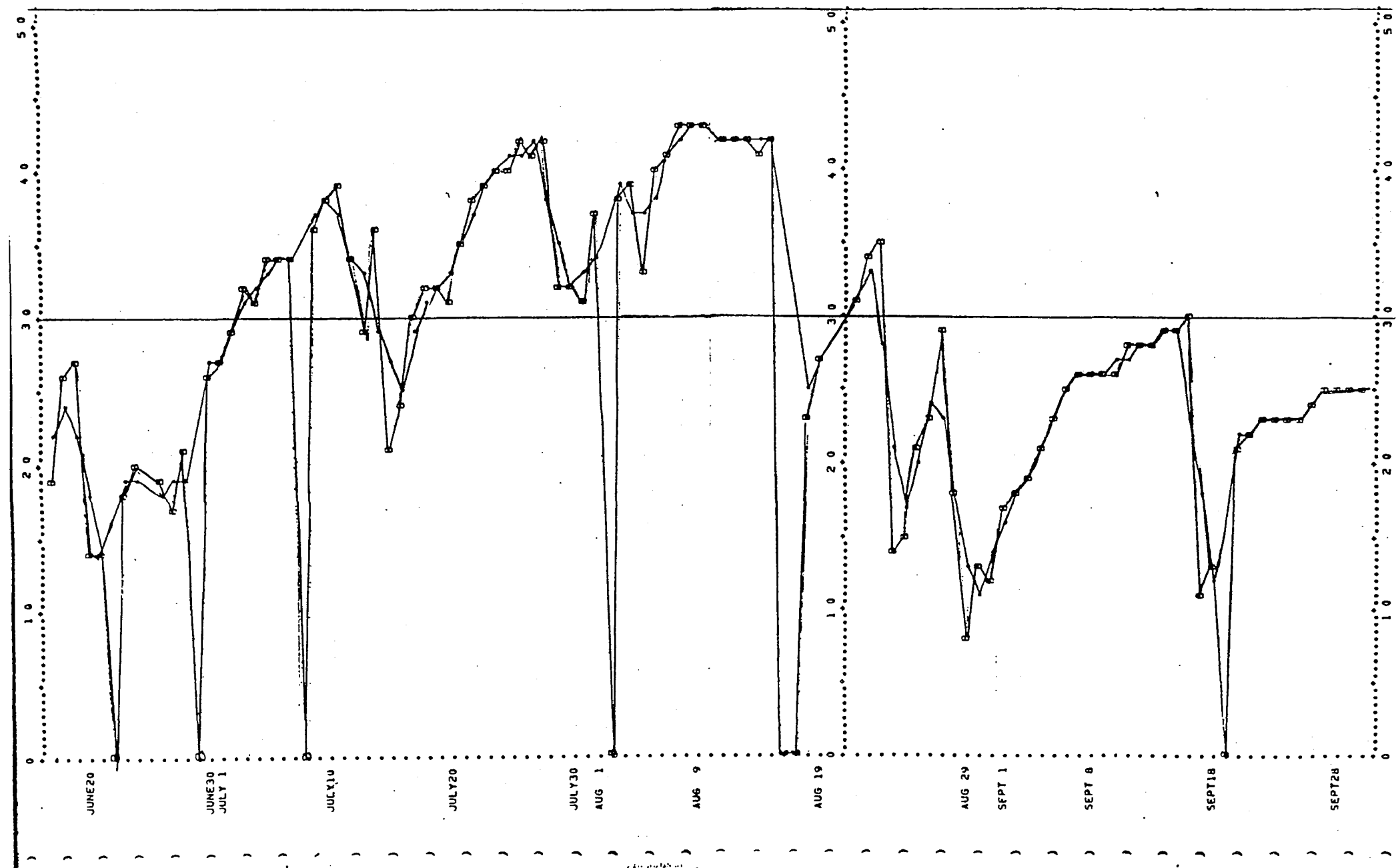


Figure 10. Energy release component---1976.

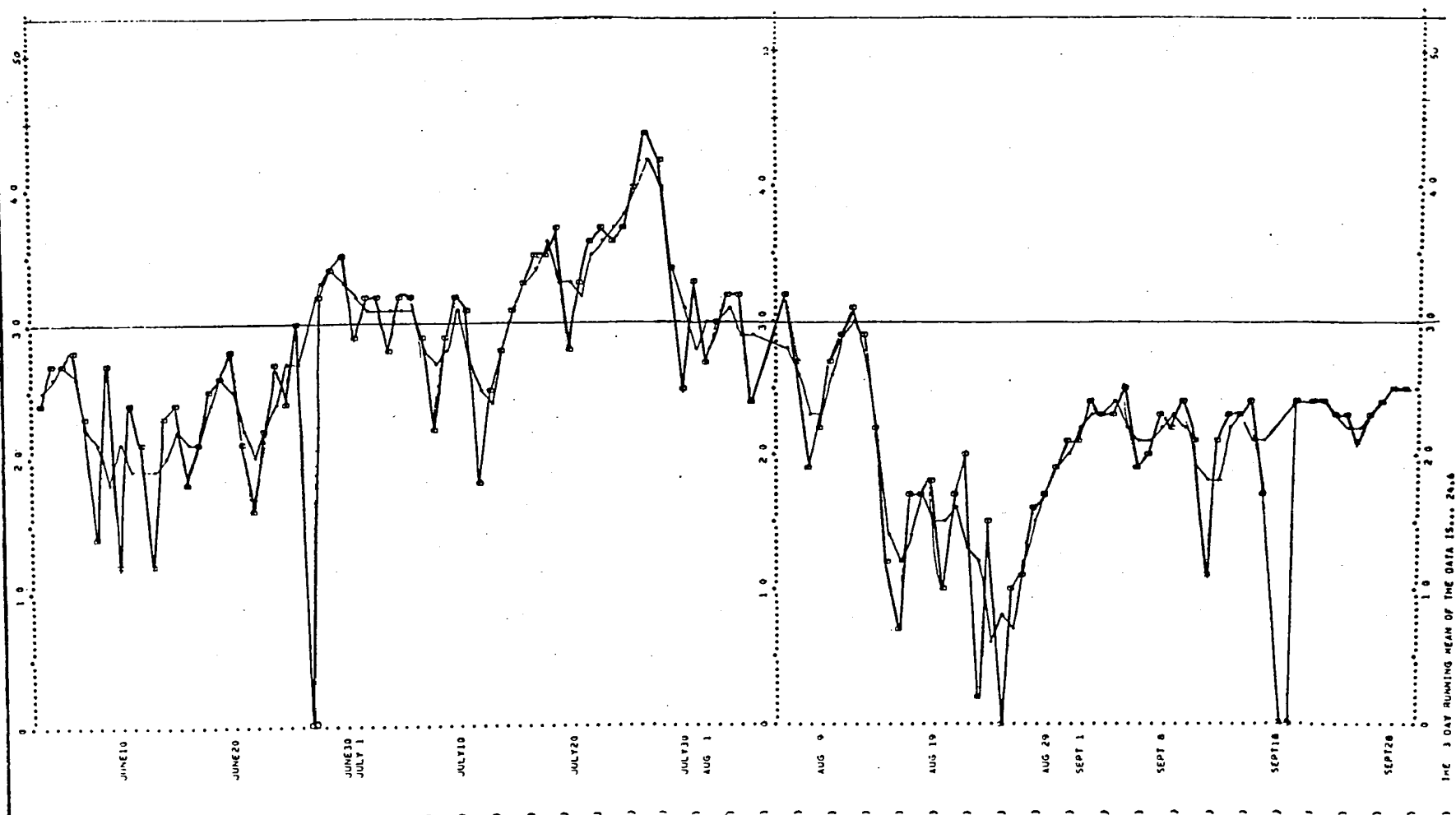


Figure 11. Energy release component---1977.

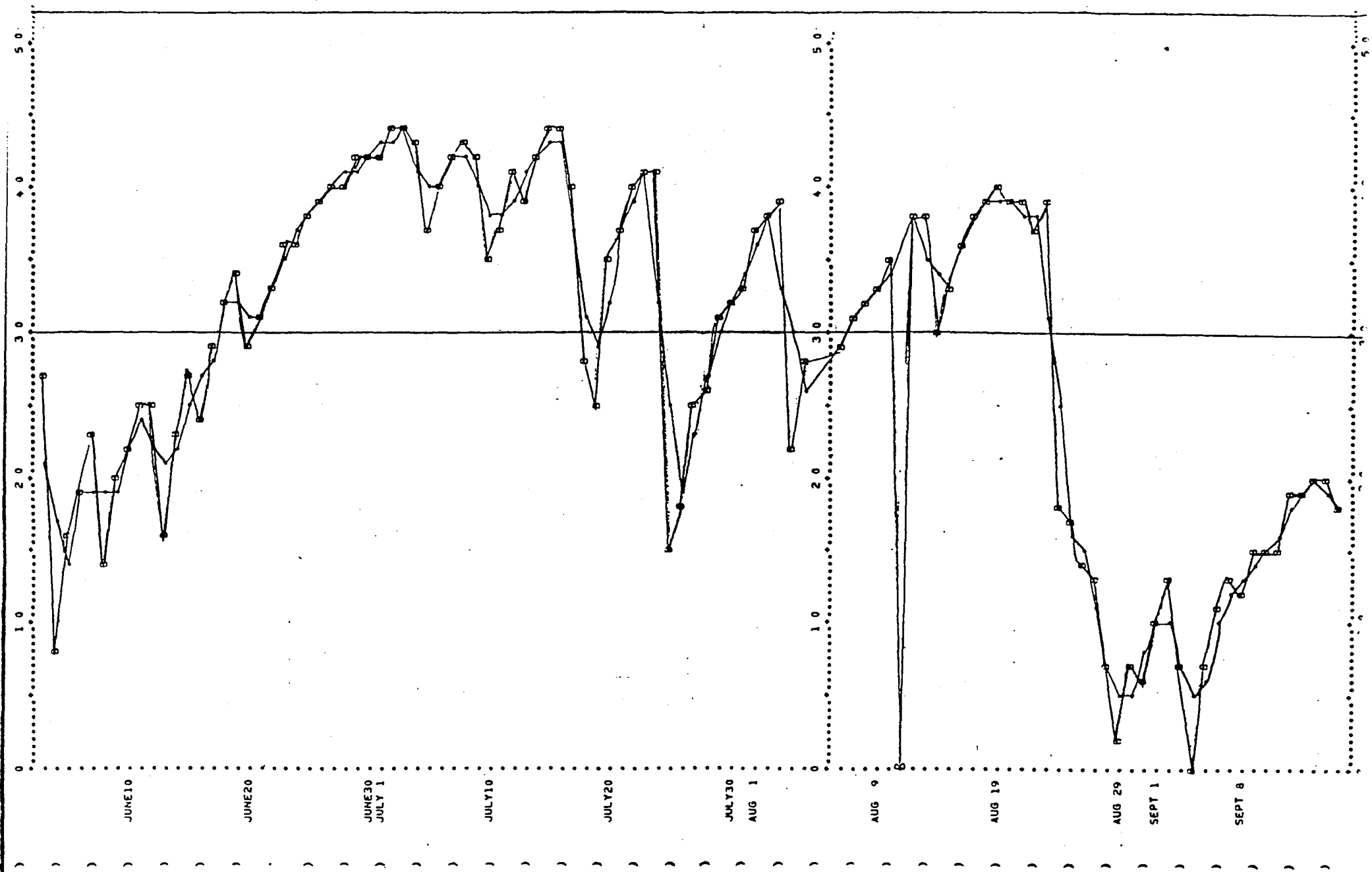


Figure 12. Energy release component 1967-1977 (L=low; ●=average; H=high).

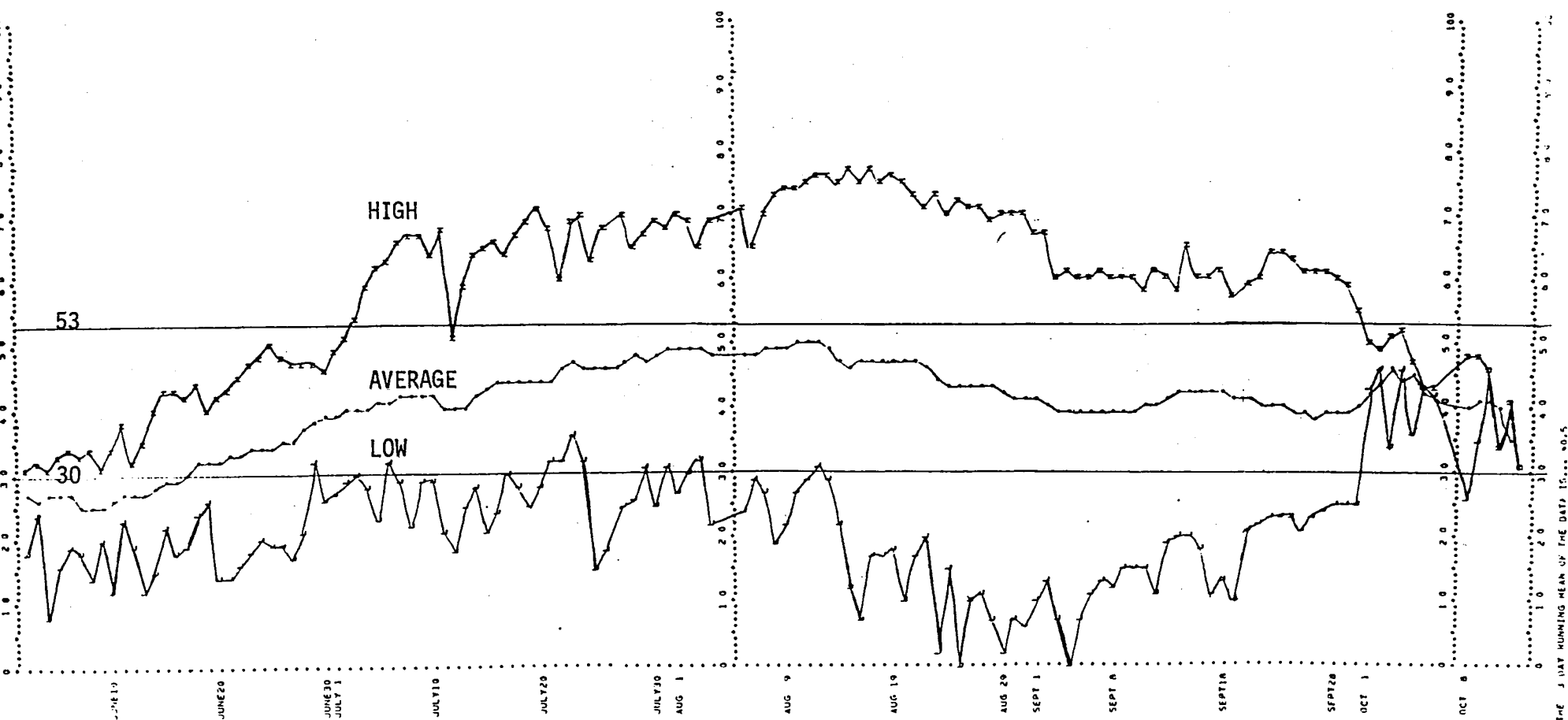


Figure 13. Frequency distribution for the energy release component 1967-1977.

FREQUENCY DISTRIBUTIONS (FRQOUT)		- 1978 NFDR		12 JUNE 78	PAGE 46
TROY	240112	MODEL-SLOPE-HERB G-3-P	CLIMATE 2	ELEV-LAT= 1950-47	FIRE SEASON 5/ 1 THRU 10/31
<u>ENERGY RELEASE</u>		TOTAL NO OF DAYS	1263	NO OF CLASSES	40
		STEP SIZE		2	
CLASS NO.	UPPER BOUNDARY	NO. IN CLASS	RELATIVE FREQ	CUMULATIVE FREQ	90.%= 60.56 97.%= 68.92
1	0	2	.2	.2	
2	2	2	.2	.3	
3	4	0	.0	.3	
4	6	1	.1	.4	
5	8	7	.6	1.0	
6	10	4	.3	1.3	
7	12	9	.7	2.0	
8	14	12	1.0	2.9	
9	16	12	1.0	3.9	
10	18	21	1.7	5.5	
11	20	23	1.8	7.4	
12	22	30	2.4	9.7	
13	24	50	4.0	13.7	
14	26	45	3.6	17.3	
15	28	45	3.6	20.8	
16	30	66	5.2	26.0	
17	32	71	5.6	31.7	
18	34	66	5.2	36.9	
19	36	67	5.3	42.2	
20	38	68	5.4	47.6	
21	40	77	6.1	53.7	
22	42	61	4.8	58.5	
23	44	58	4.6	63.1	
24	46	44	3.5	66.6	
25	48	53	4.2	70.8	
26	50	46	3.6	74.4	
27	52	60	4.8	79.2	
28	54	33	2.6	81.8	
29	56	26	2.1	83.8	
30	58	30	2.4	86.2	
31	60	41	3.2	89.5	
32	62	24	1.9	91.4	
33	64	24	1.9	93.3	
34	66	21	1.7	94.9	
35	68	16	1.3	96.2	
36	70	22	1.7	97.9	
37	72	11	.9	98.8	
38	74	5	.4	99.2	
39	76	8	.6	99.8	
40	78	2	.2	100.0	

Figure 14. Cumulative frequency plotted for the energy release component 1967-1977.

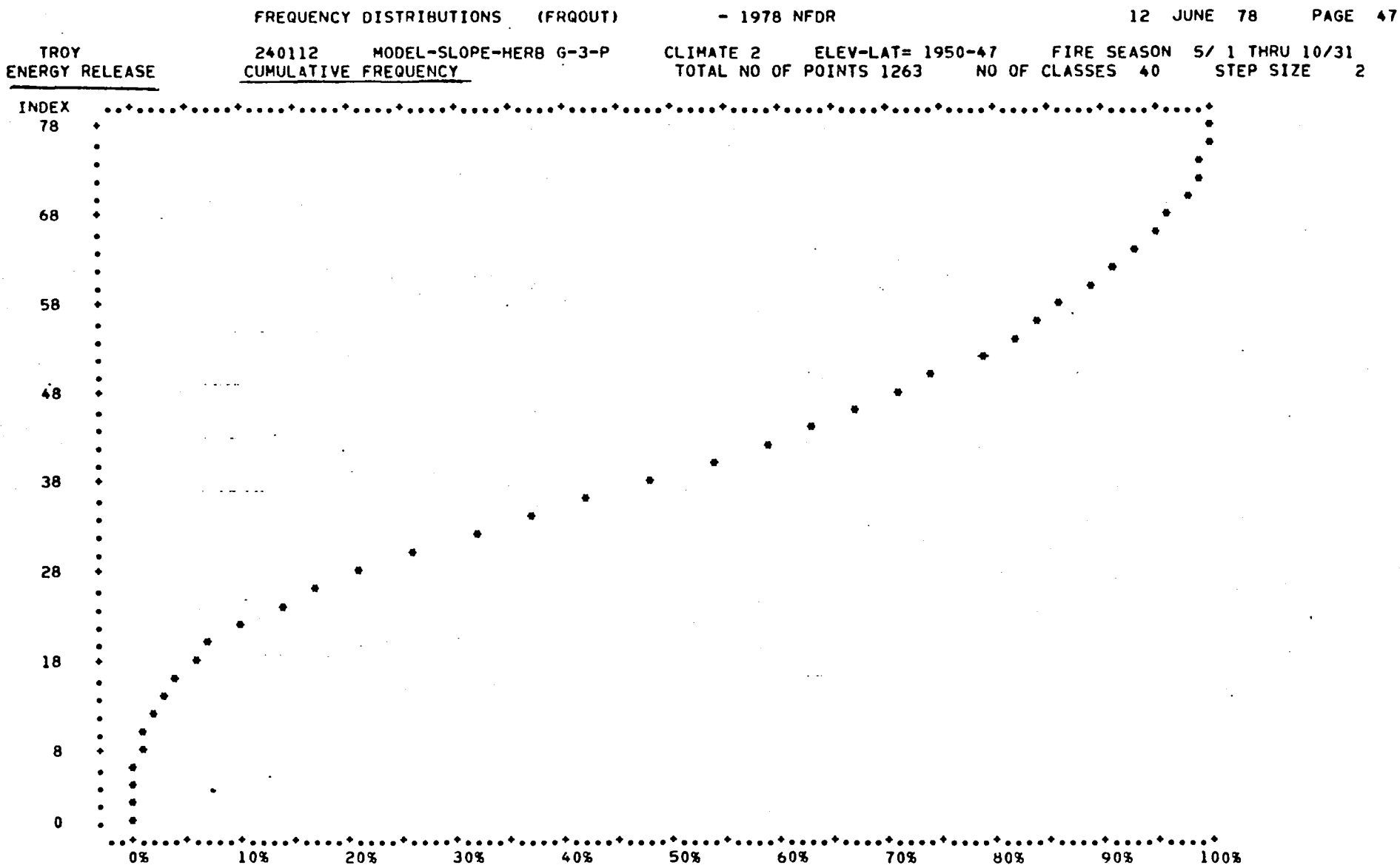


Figure 15. Burning index---1967 (B=daily; •=3 day running mean).

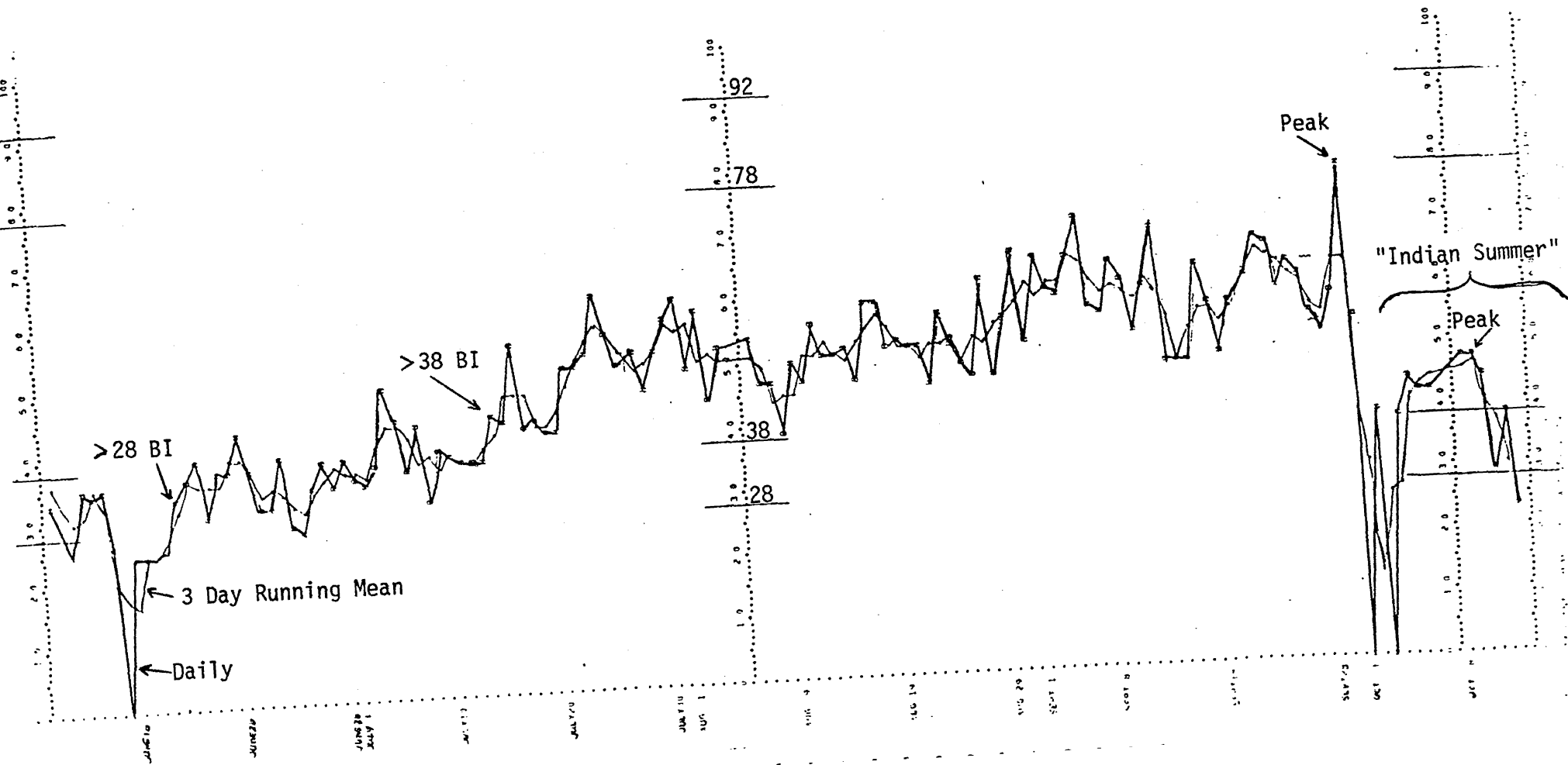


Figure 16. Burning index---1968.

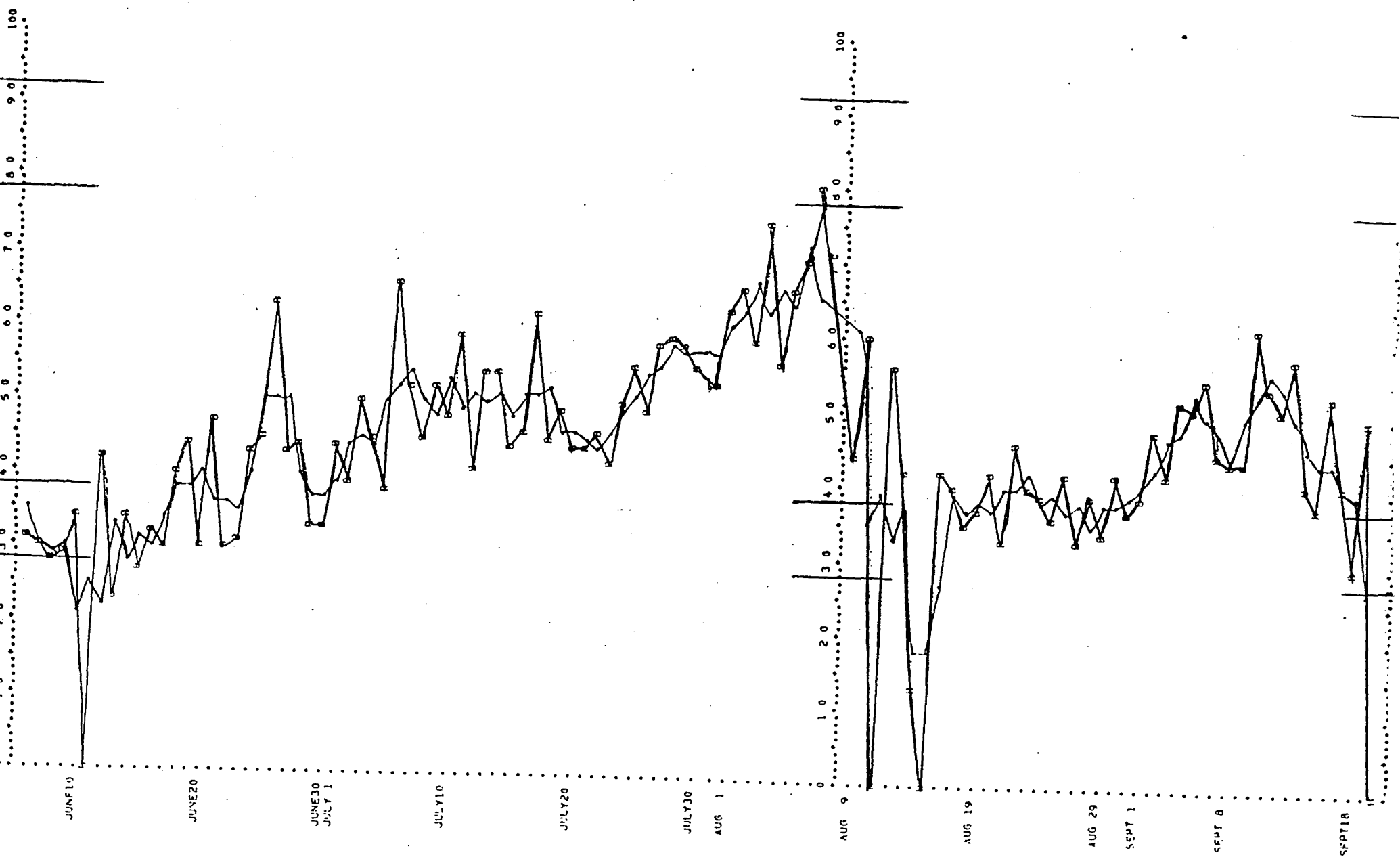


Figure 17. Burning index---1969.

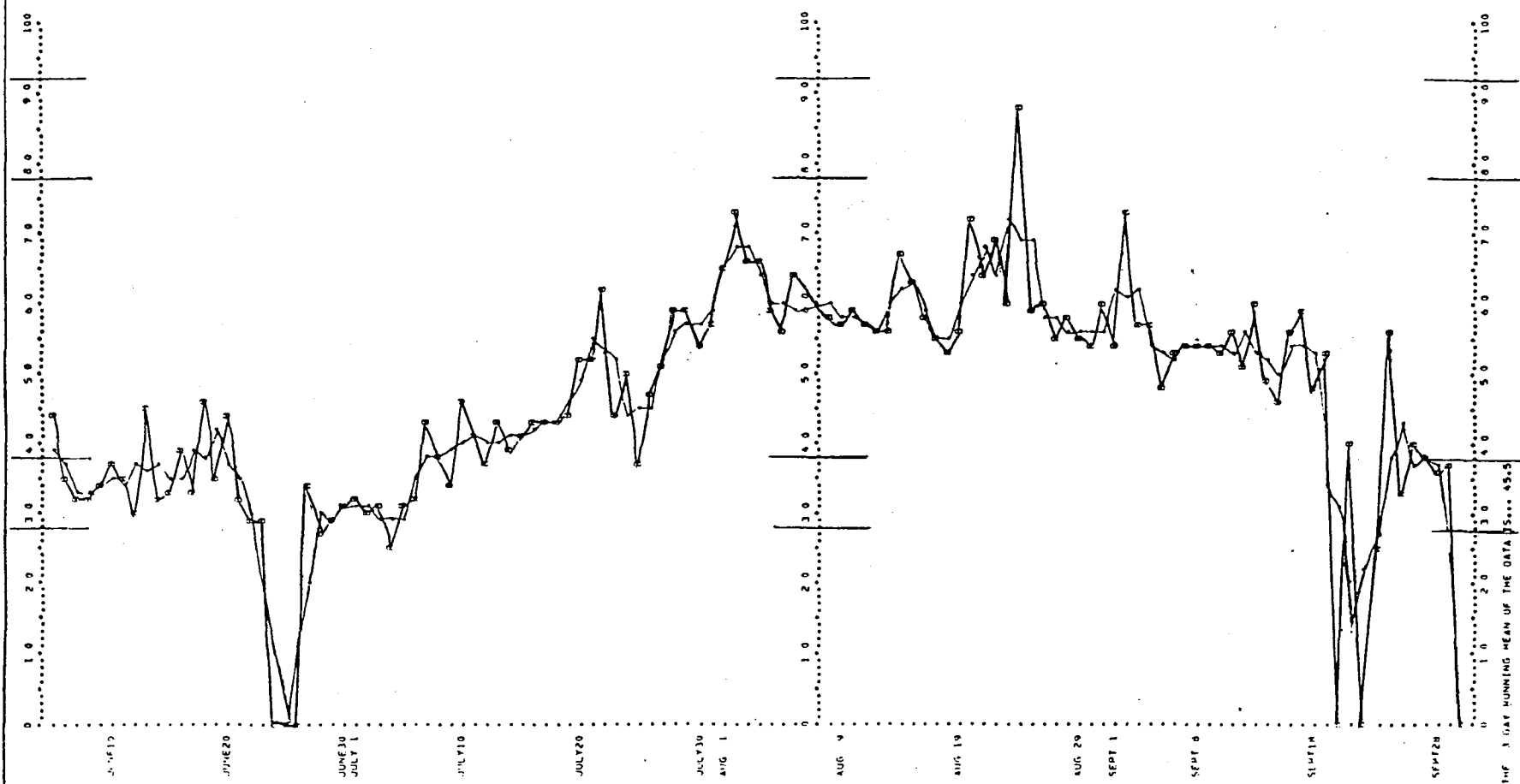


Figure 18. Burning index---1970.

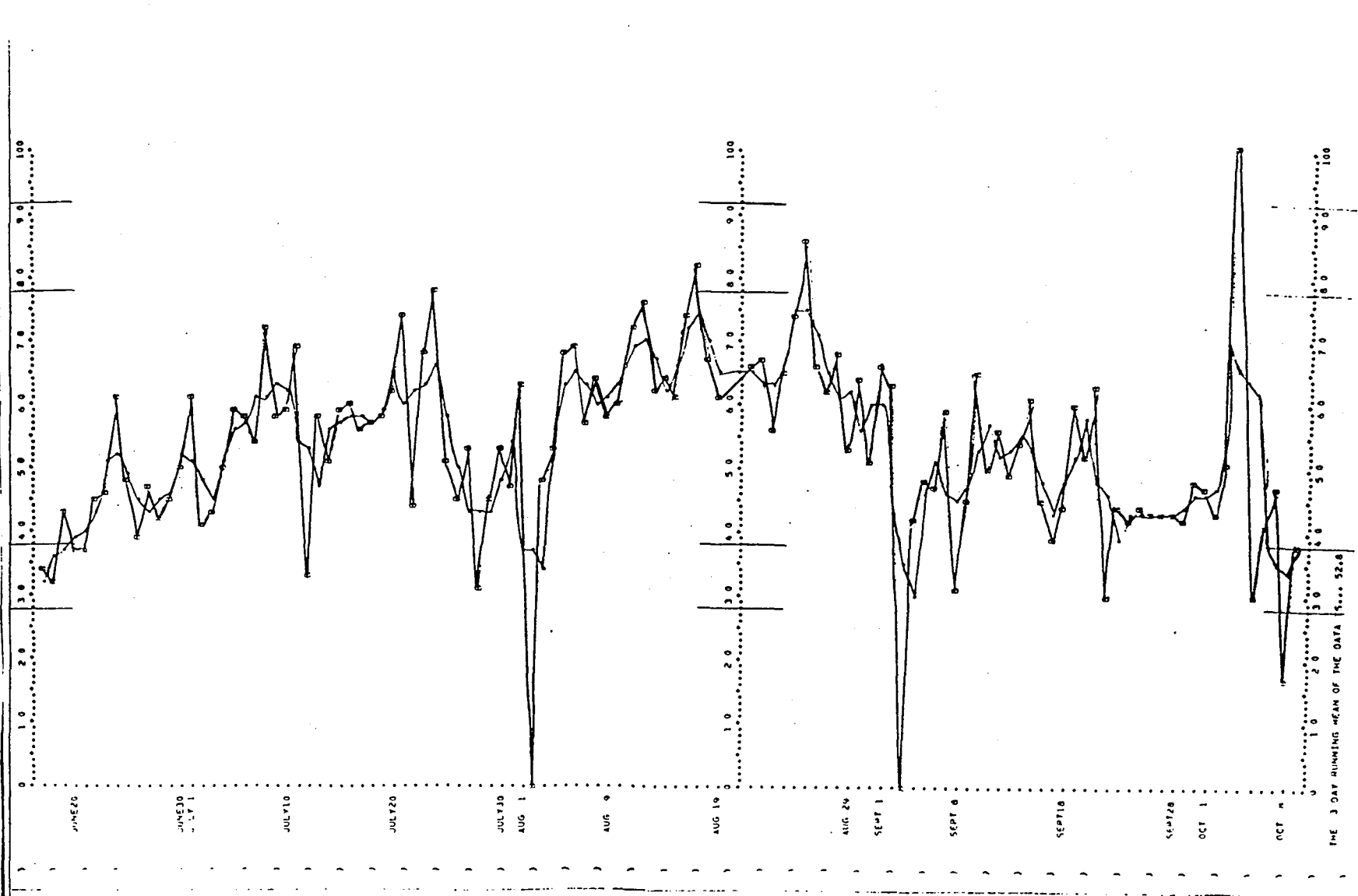


Figure 19. Burning index---1971.

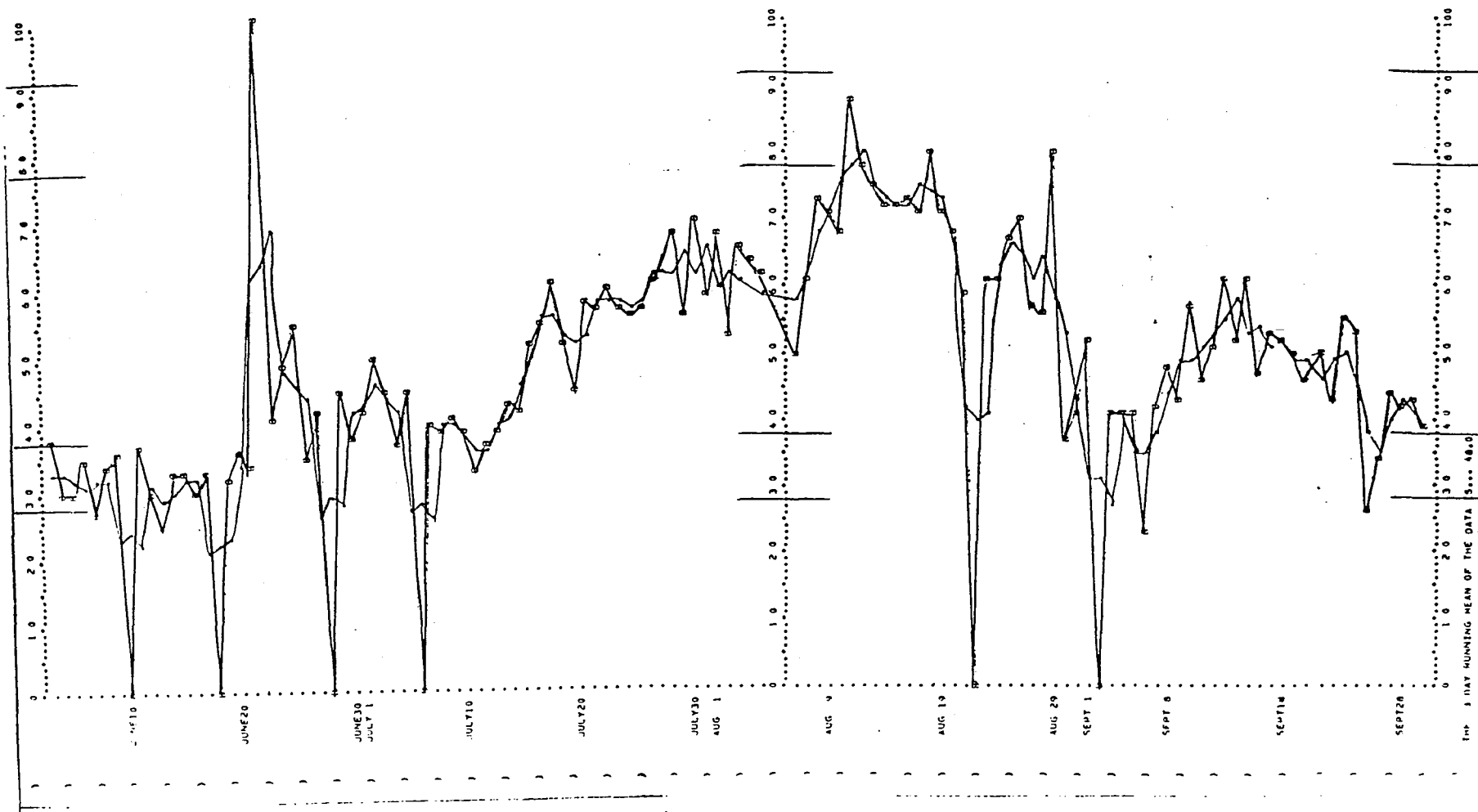
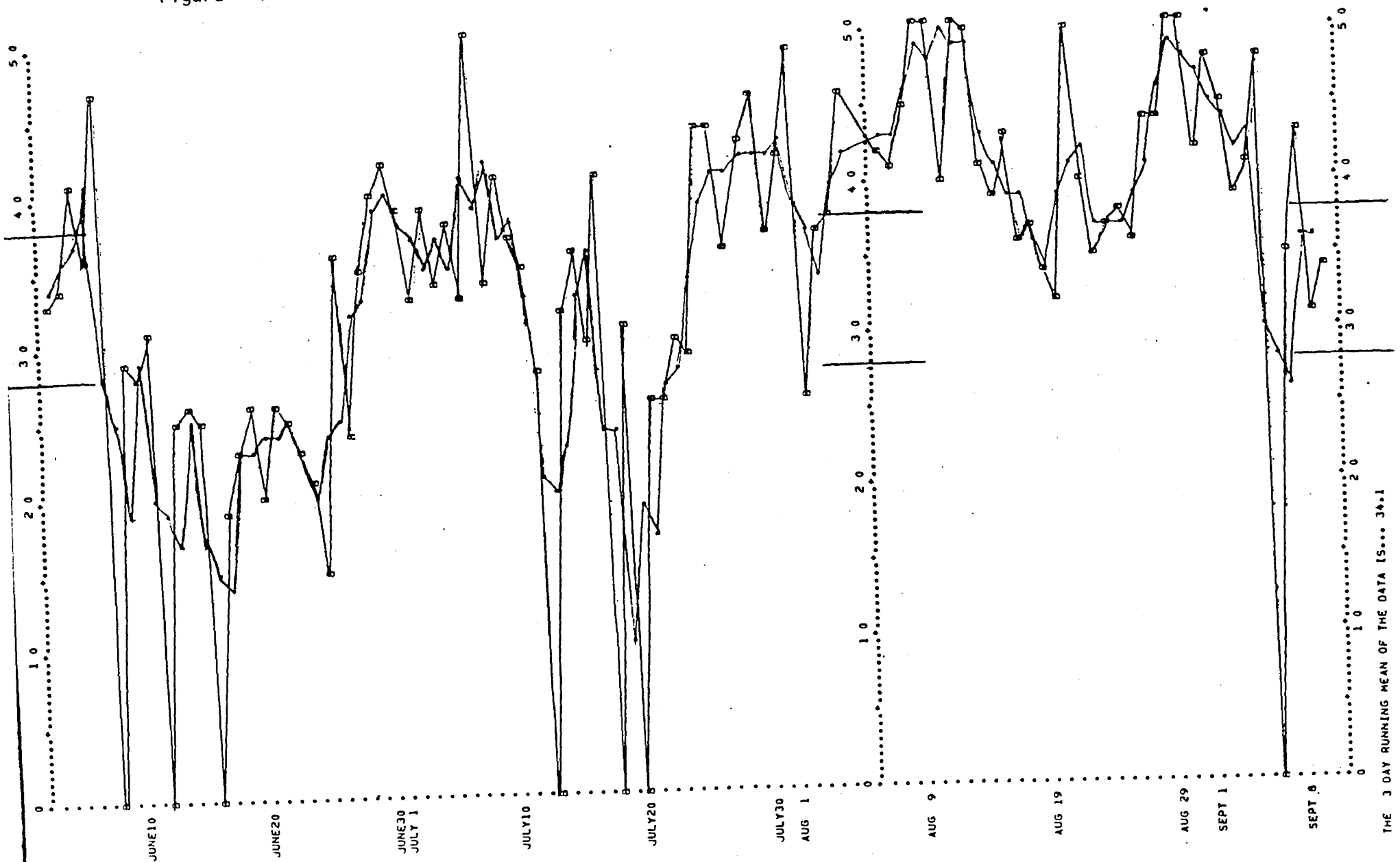


Figure 20. Burning index---1972.



THE 3 DAY RUNNING MEAN OF THE DATA IS... 34.1

Figure 21. Burning index---1973.

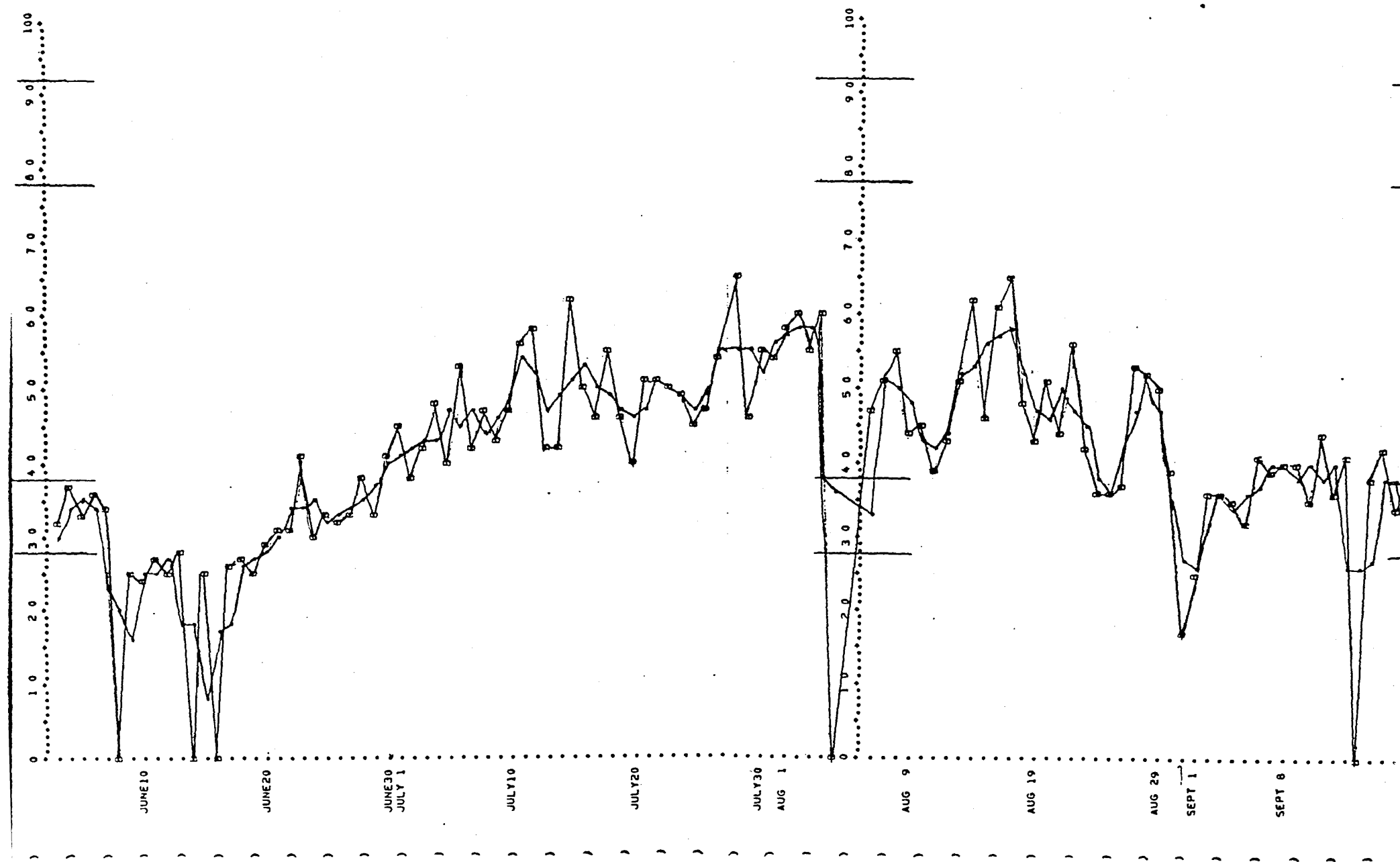


Figure 1. Energy release component---1967 (B=daily; •=3 day running mean).

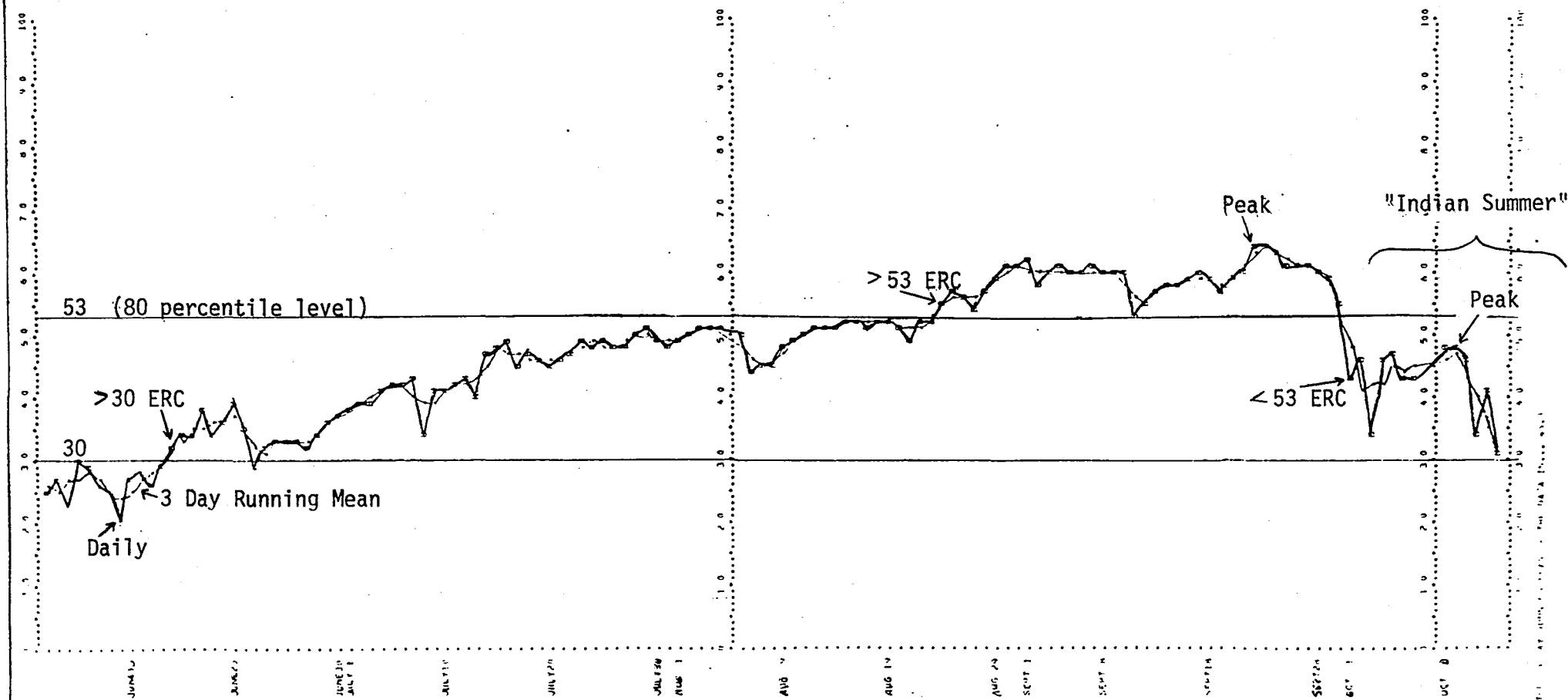


Figure 2. Energy release component---1968.

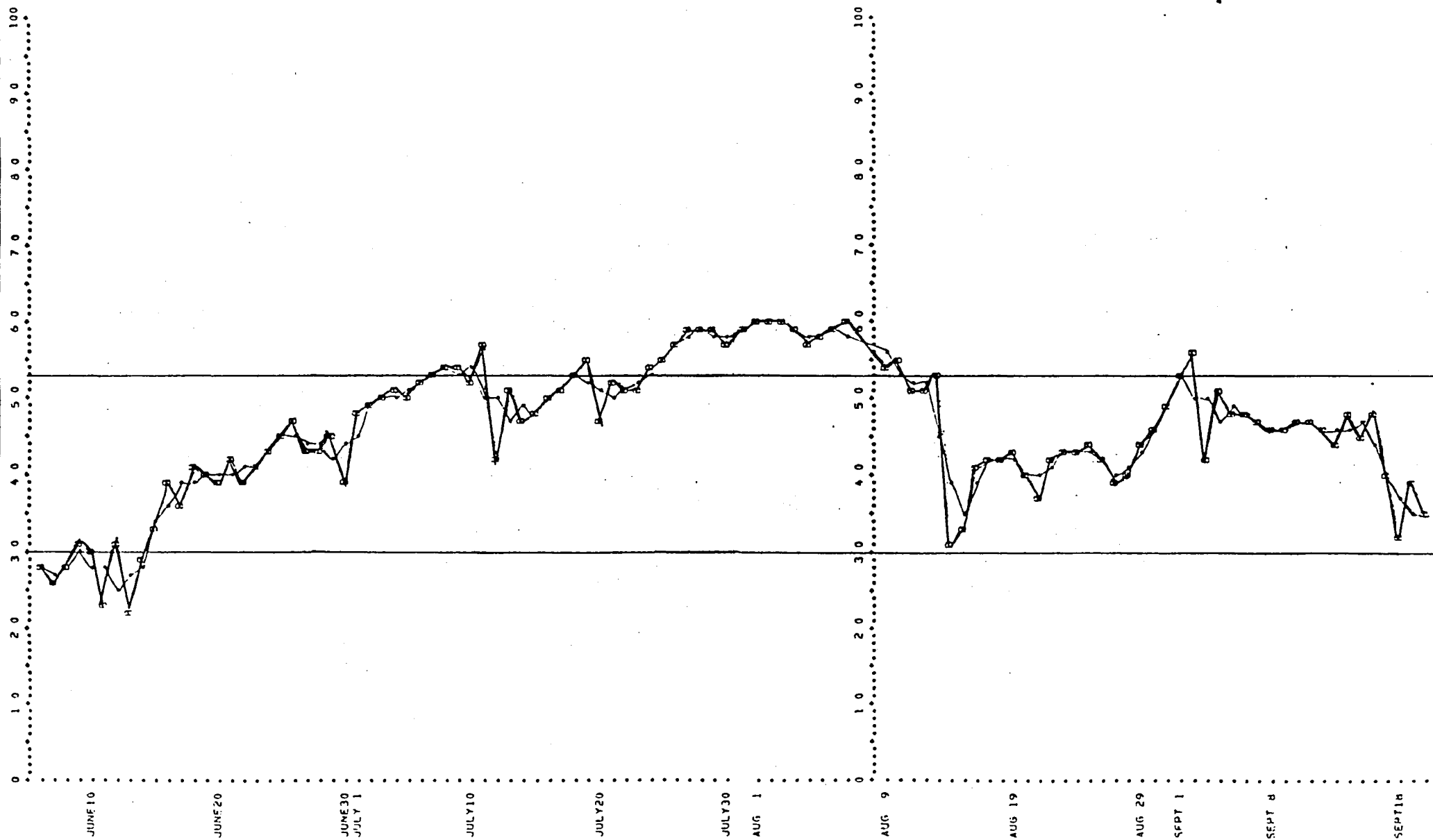


Figure 3. Energy release component---1969.

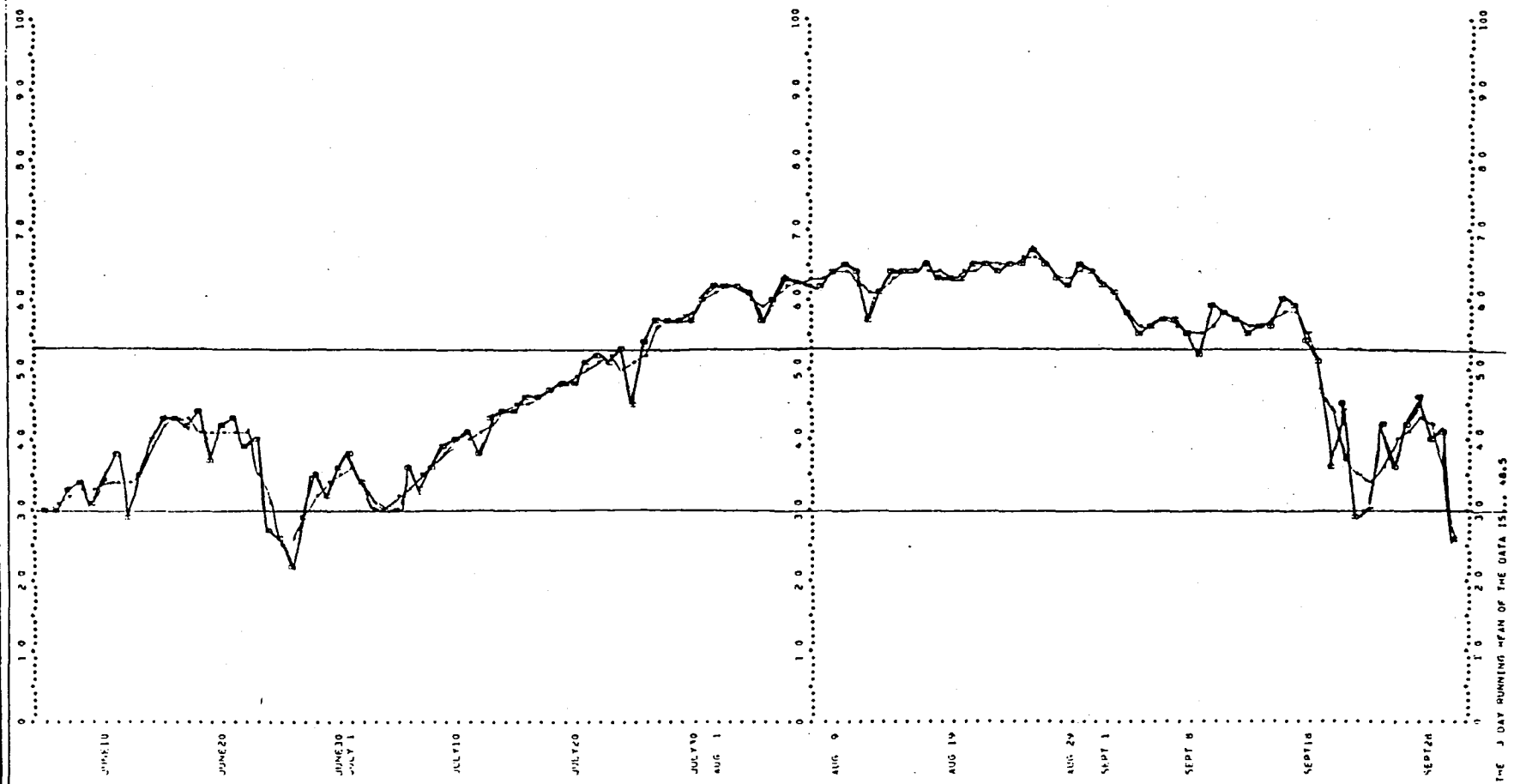


Figure 4. Energy release component---1970.

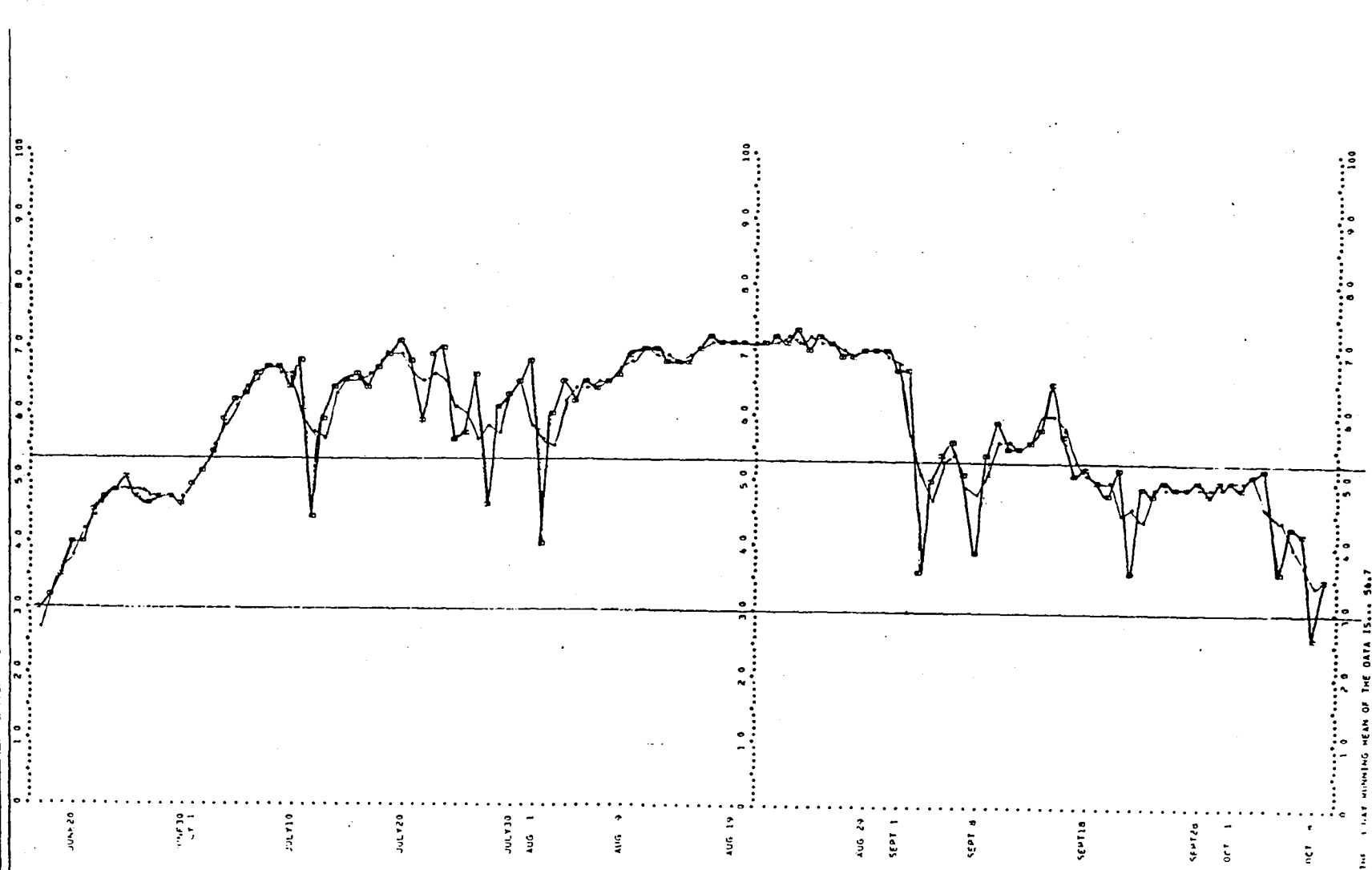
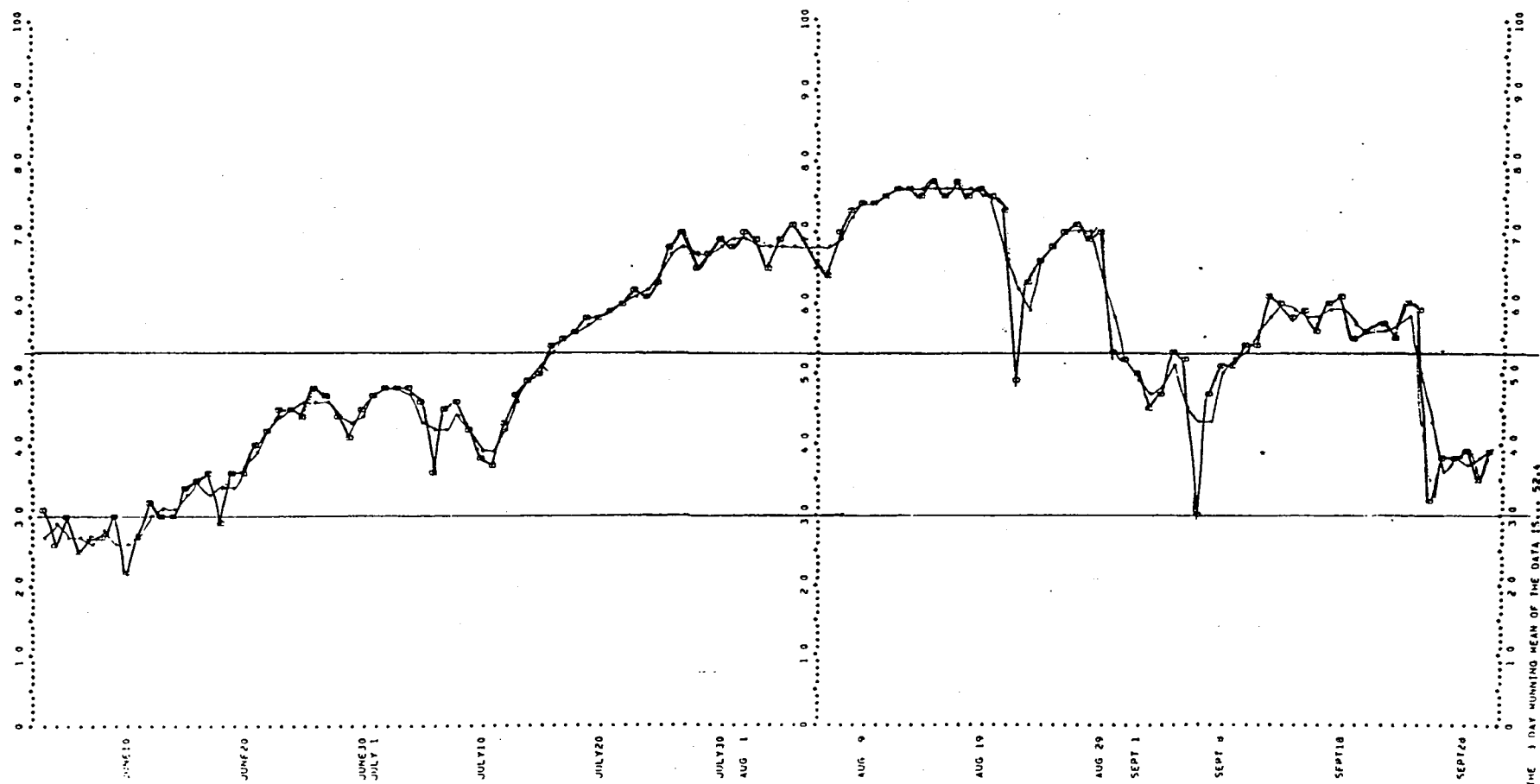


Figure 5. Energy release component---1971.



THE 3 DAY RUNNING MEAN OF THE DATA IS... 52.4

Figure 1. Energy release component---1967 (B=daily; •=3 day running mean).

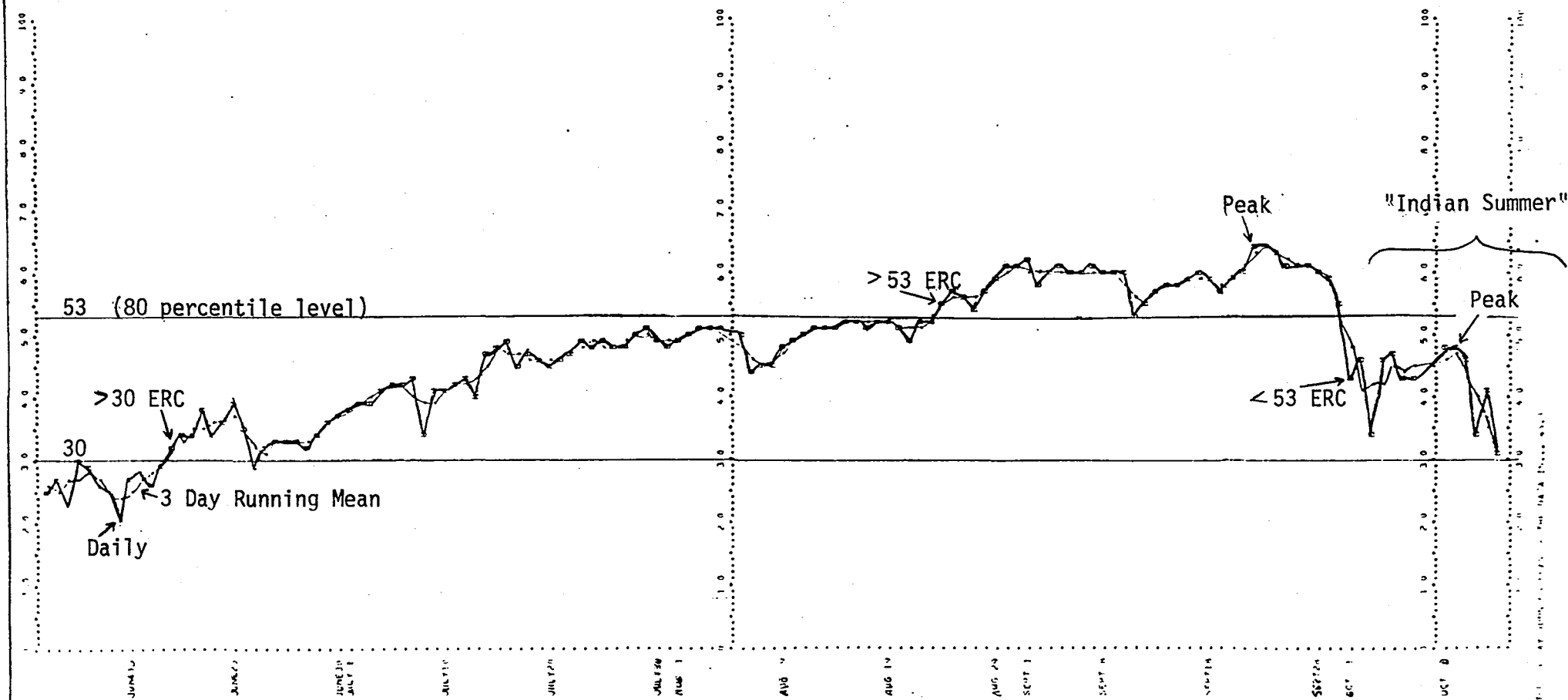


Figure 2. Energy release component---1968.

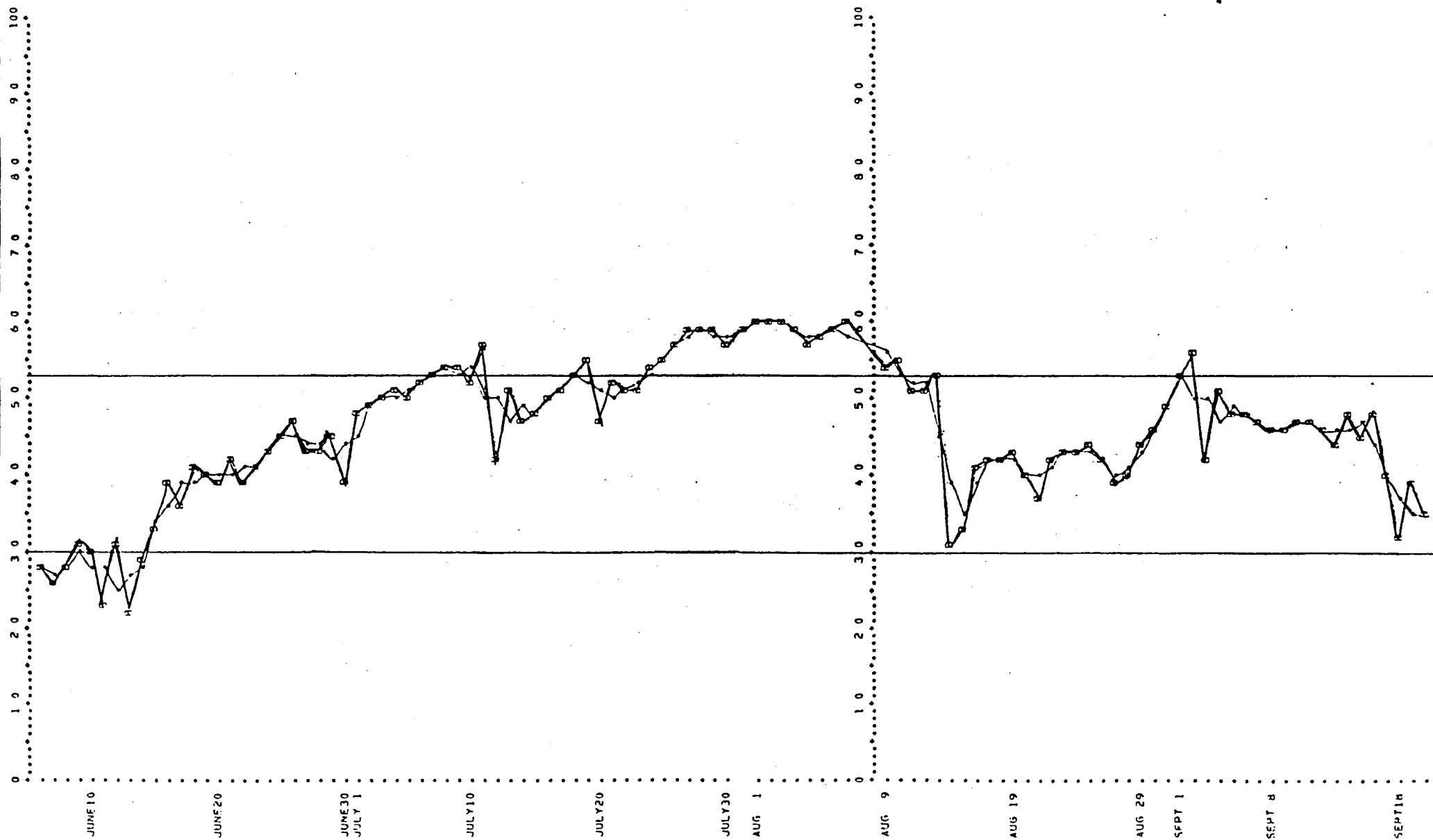
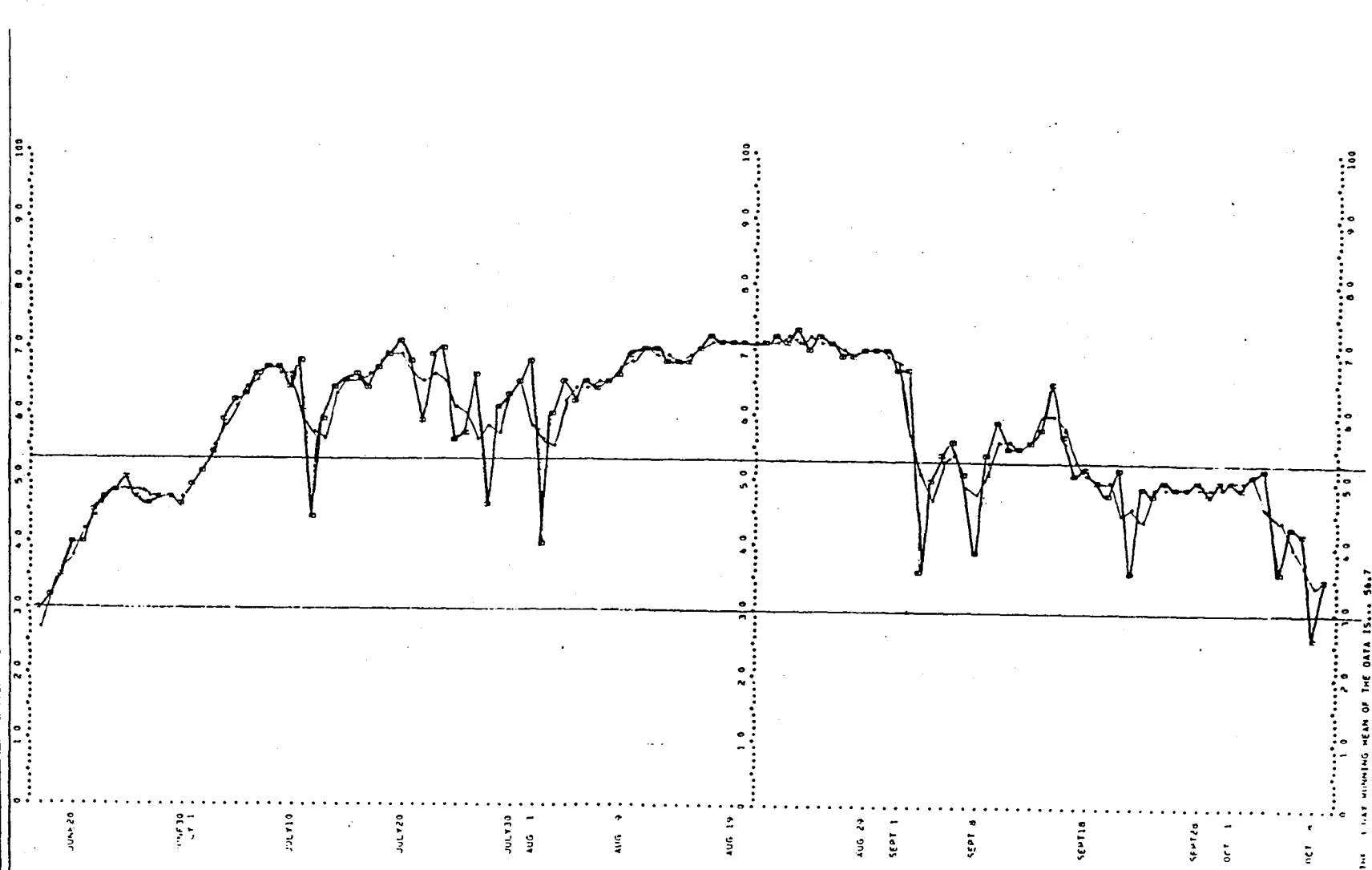
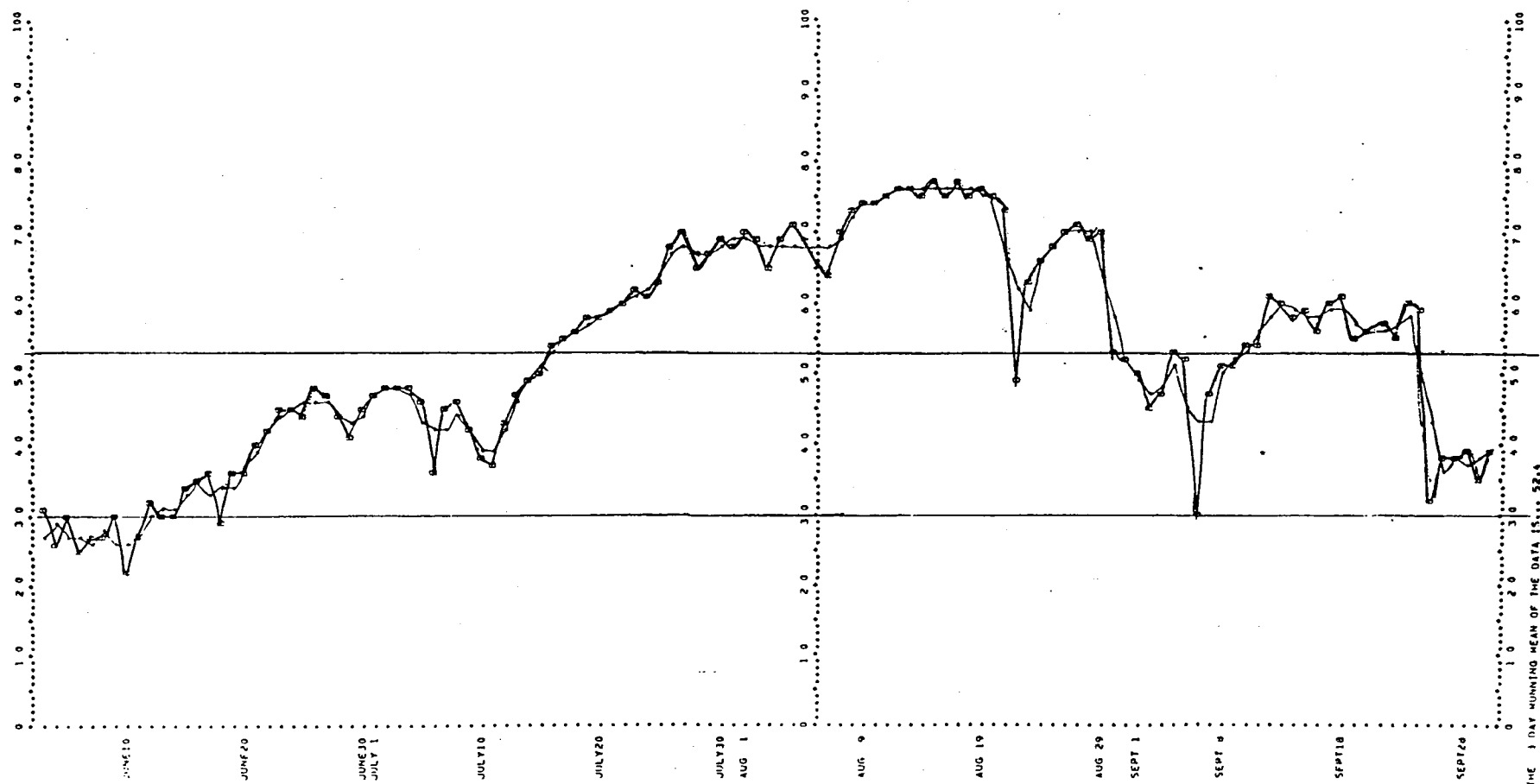


Figure 4. Energy release component---1970.



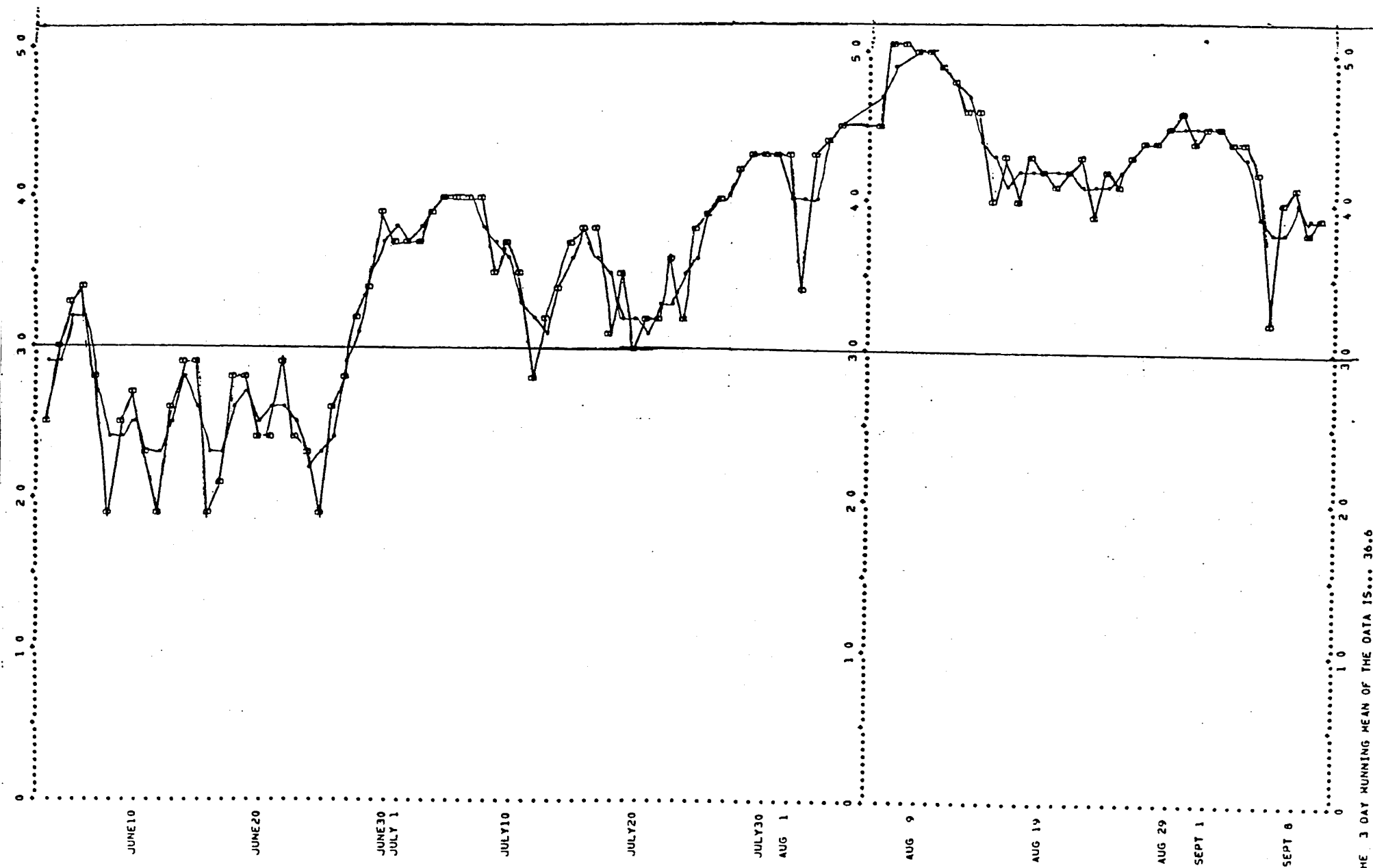
THE 1 DAY RUNNING MEAN OF THE DATA IS... 56.7

Figure 5. Energy release component---1971.



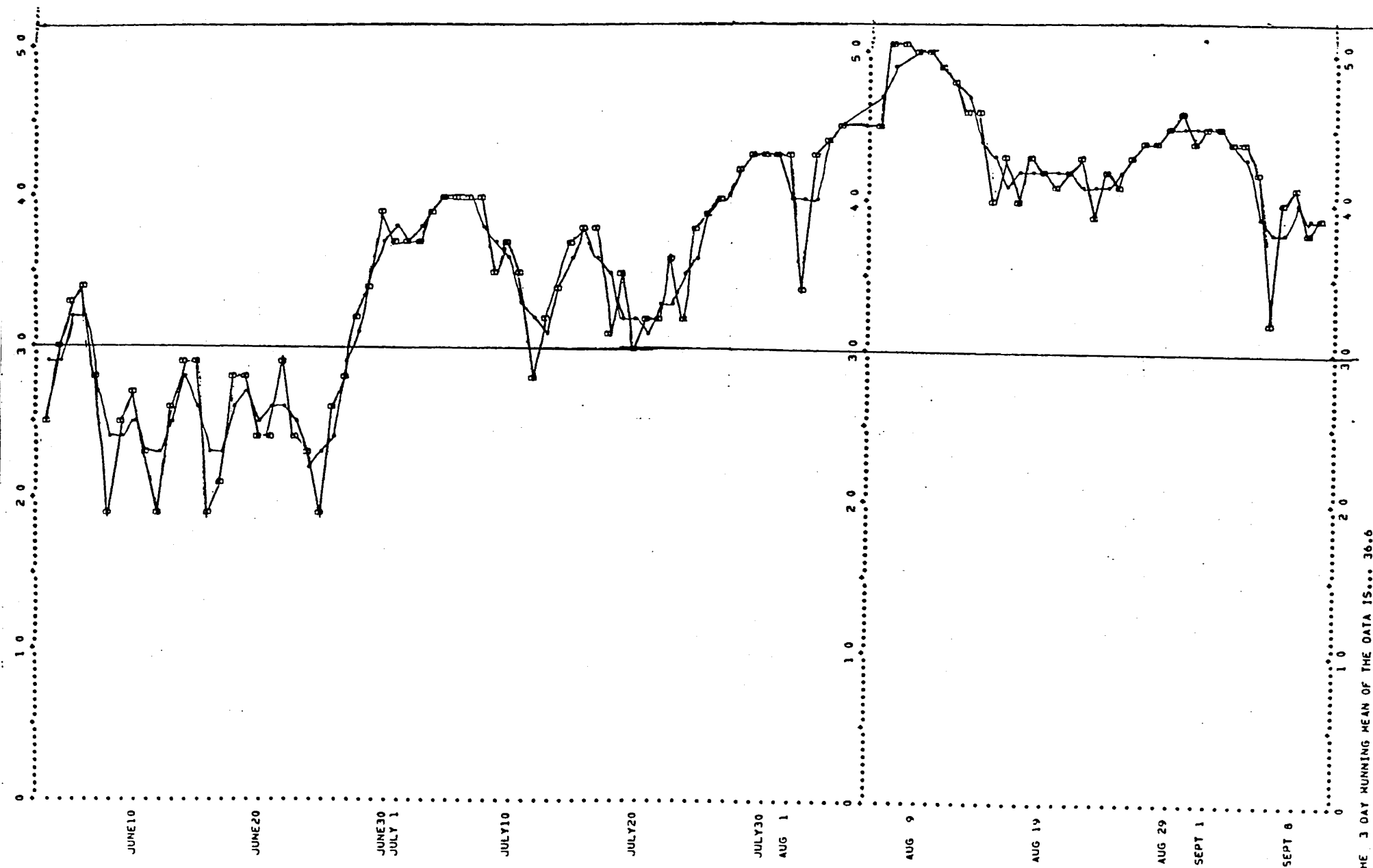
THE 3 DAY RUNNING MEAN OF THE DATA IS... 52.4

Figure 6. Energy release component---1972.



THE 3 DAY RUNNING MEAN OF THE DATA IS... 36.6

Figure 6. Energy release component---1972.



THE 3 DAY RUNNING MEAN OF THE DATA 15... 36.6

Figure 7. Energy release component---1973.

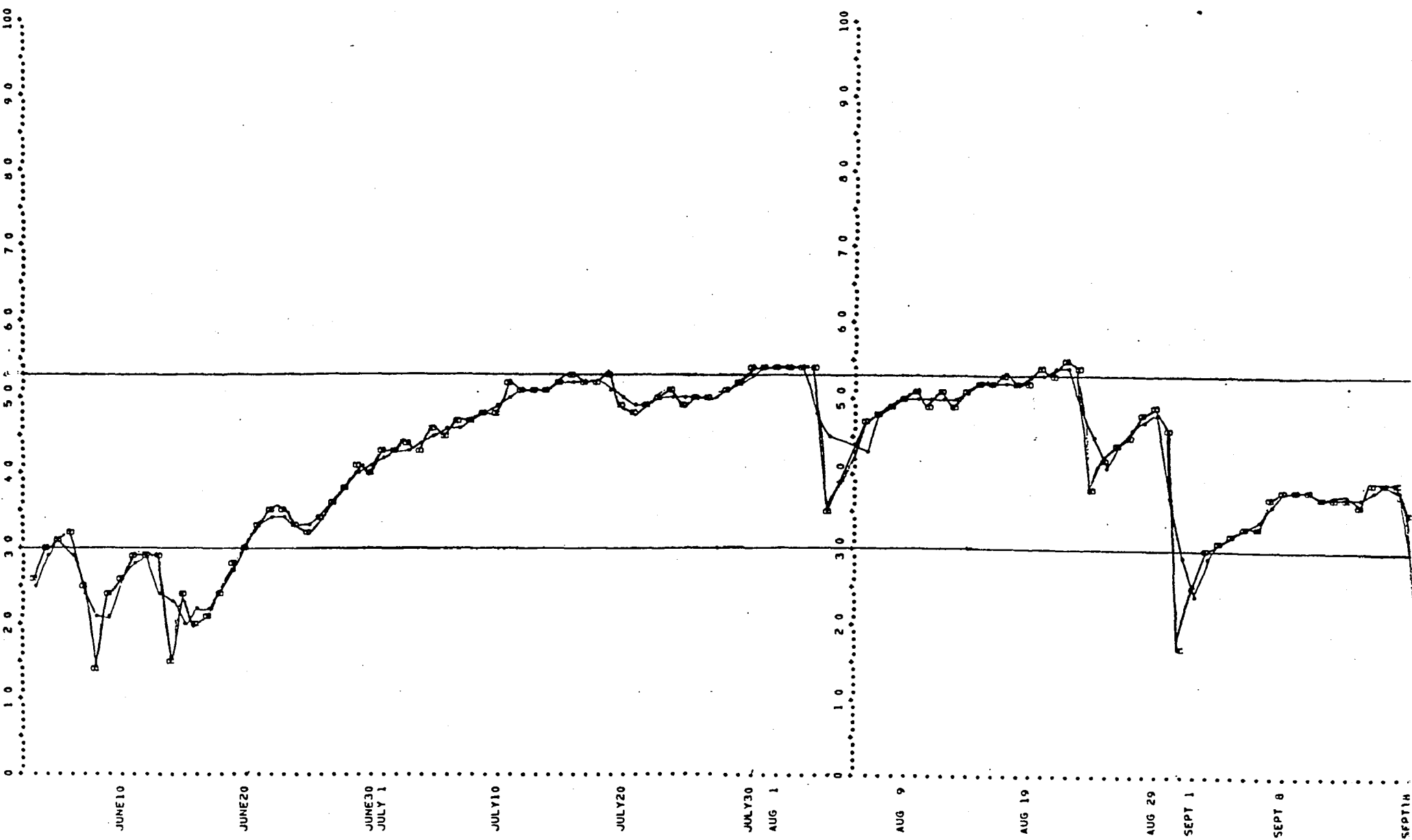
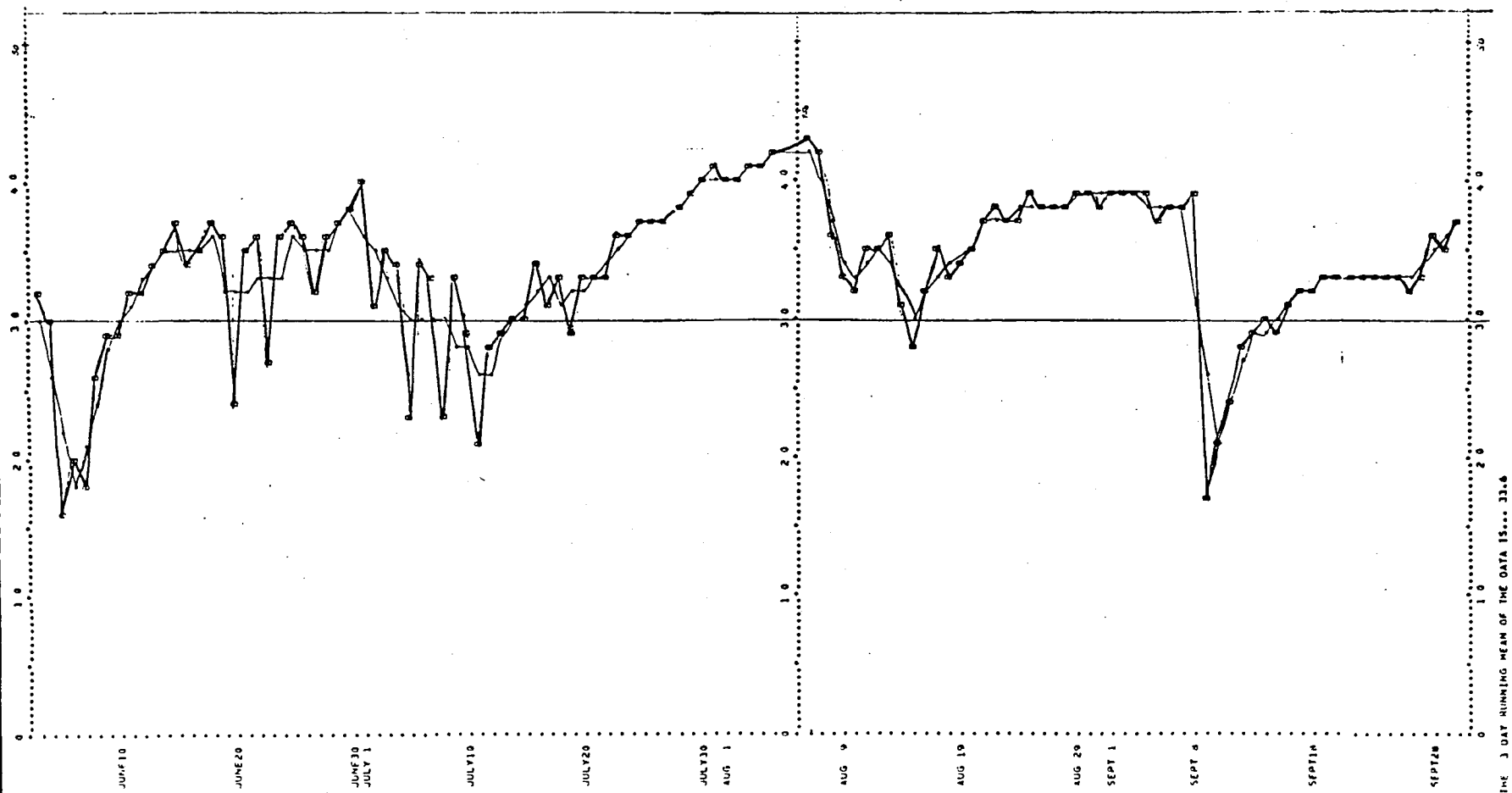


Figure 8. Energy release component---1974.



THE 3 DAY RUNNING MEAN OF THE DATA IS... 33.6

Figure 9. Energy release component---1975.

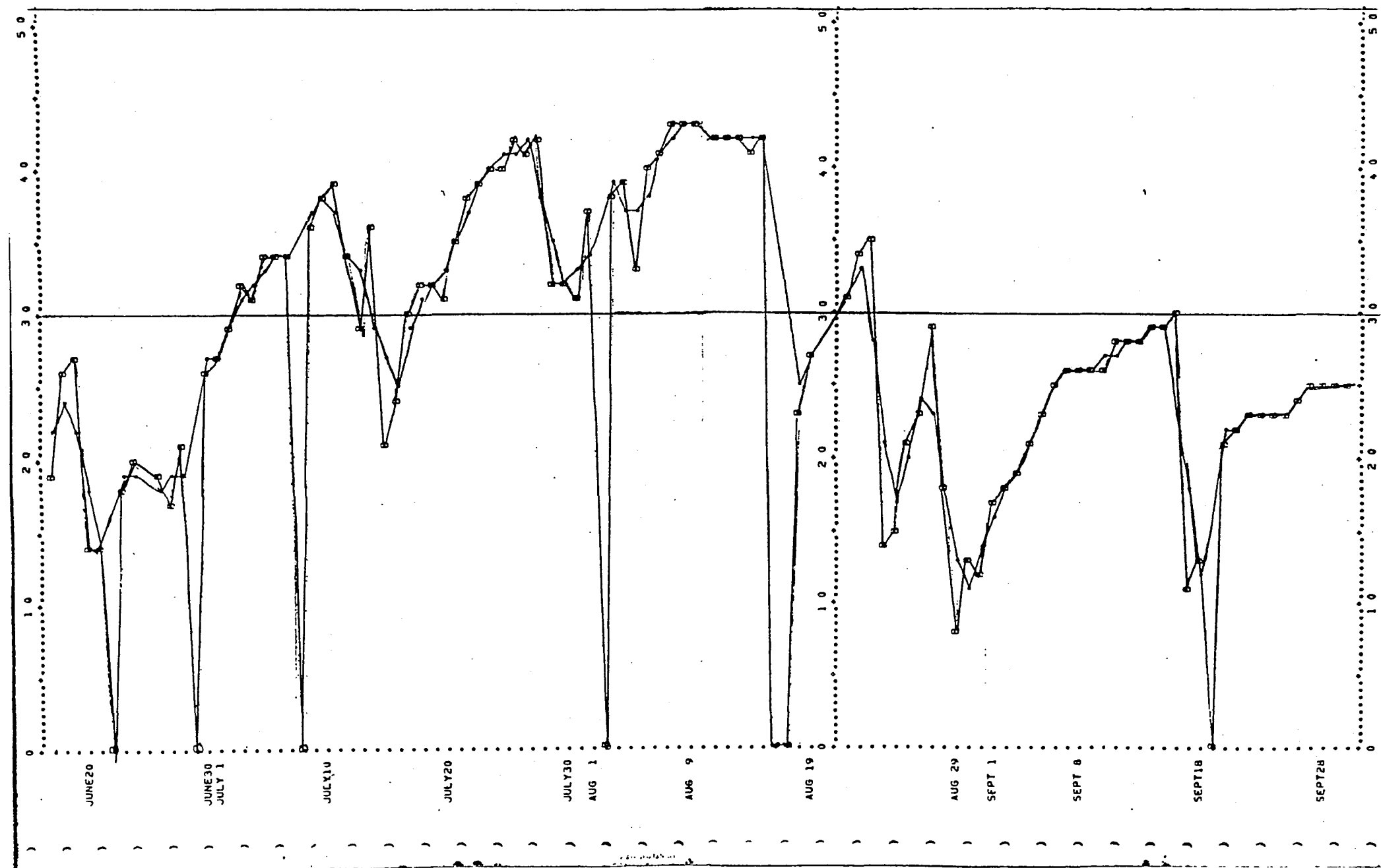
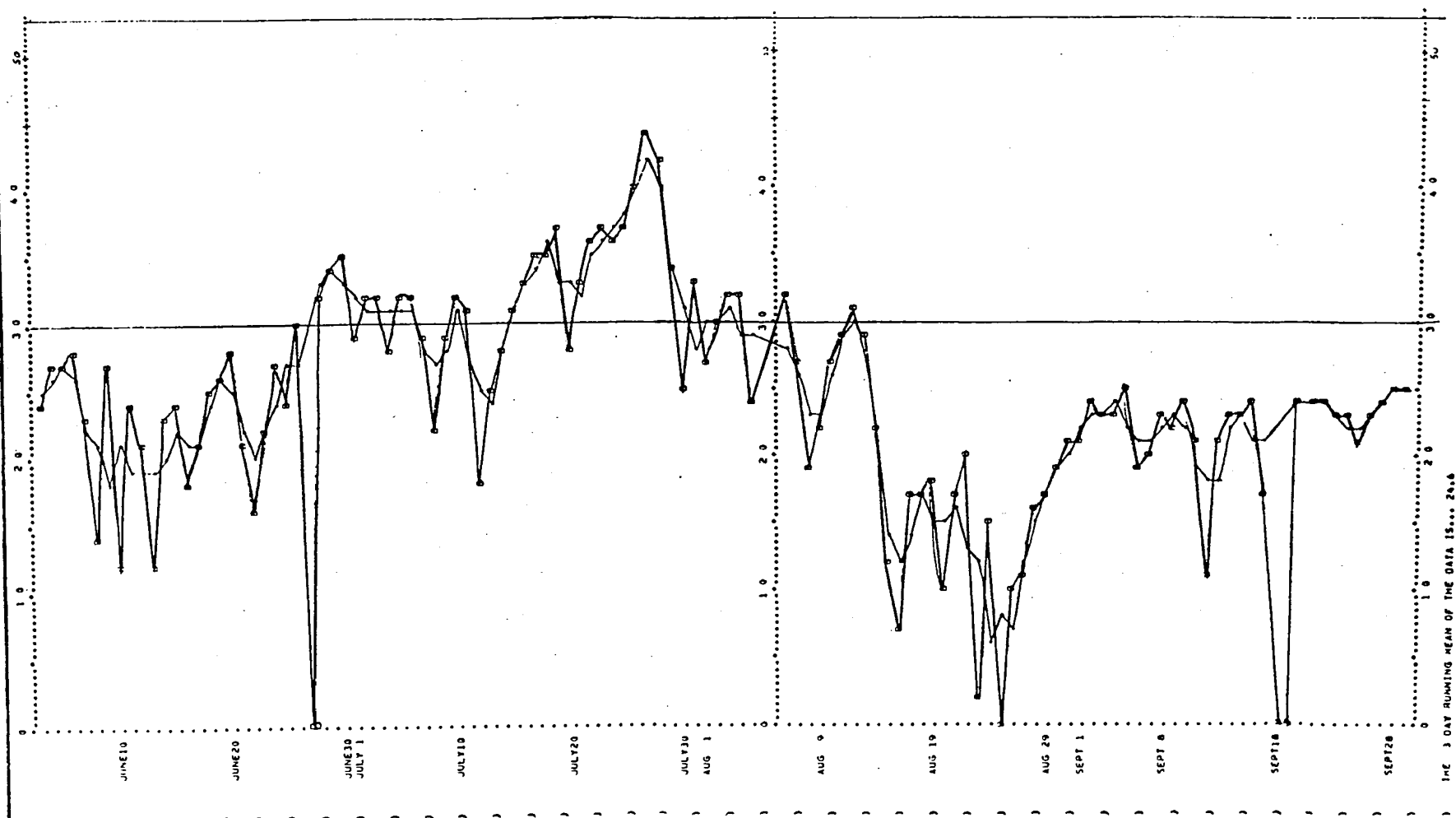


Figure 10. Energy release component---1976.



THE 3 DAY RUNNING MEAN OF THE DATA IS... 24.6

Figure 11. Energy release component---1977.

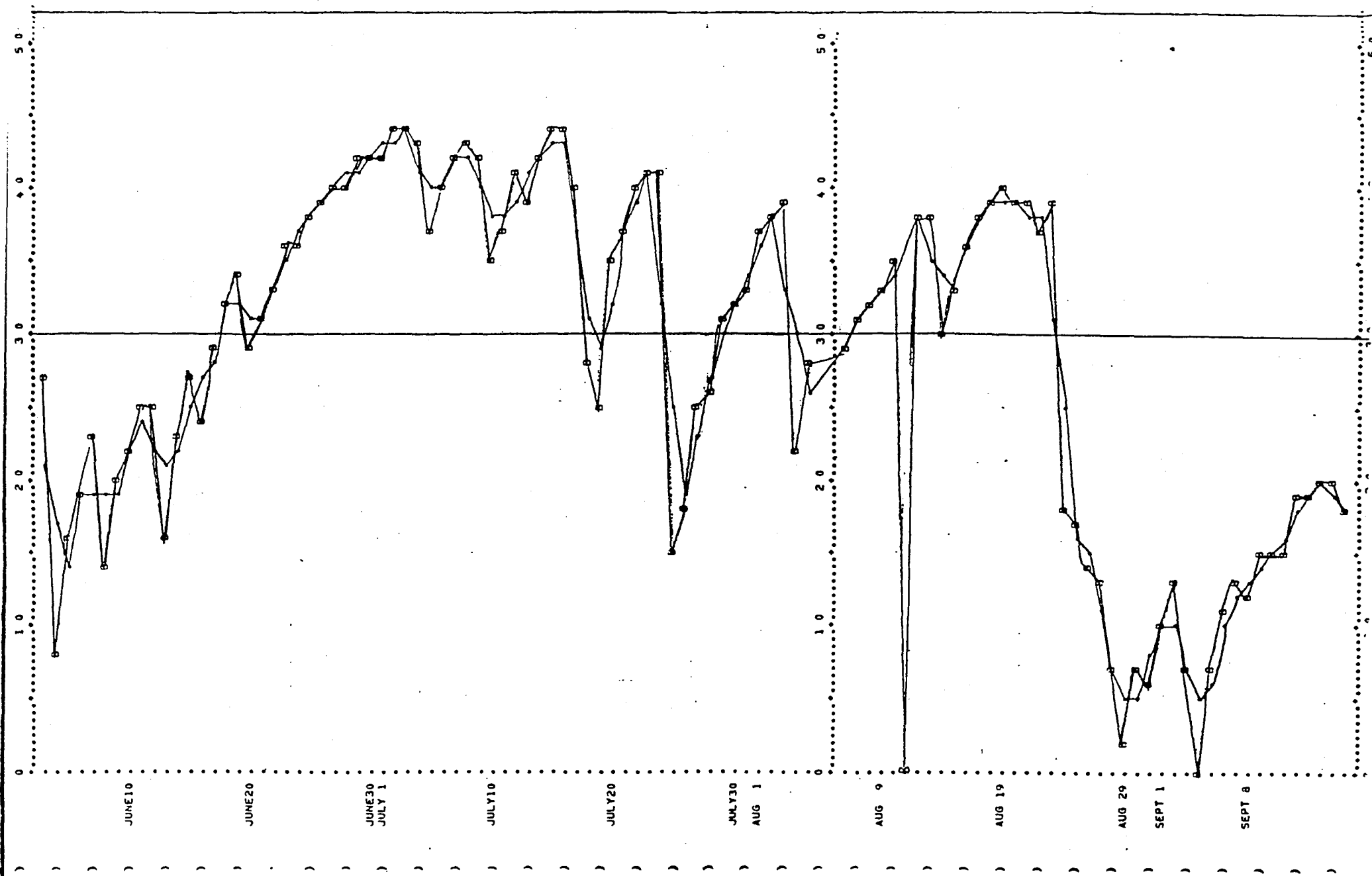


Figure 12. Energy release component 1967-1977 (L=low; ●=average; H=high).

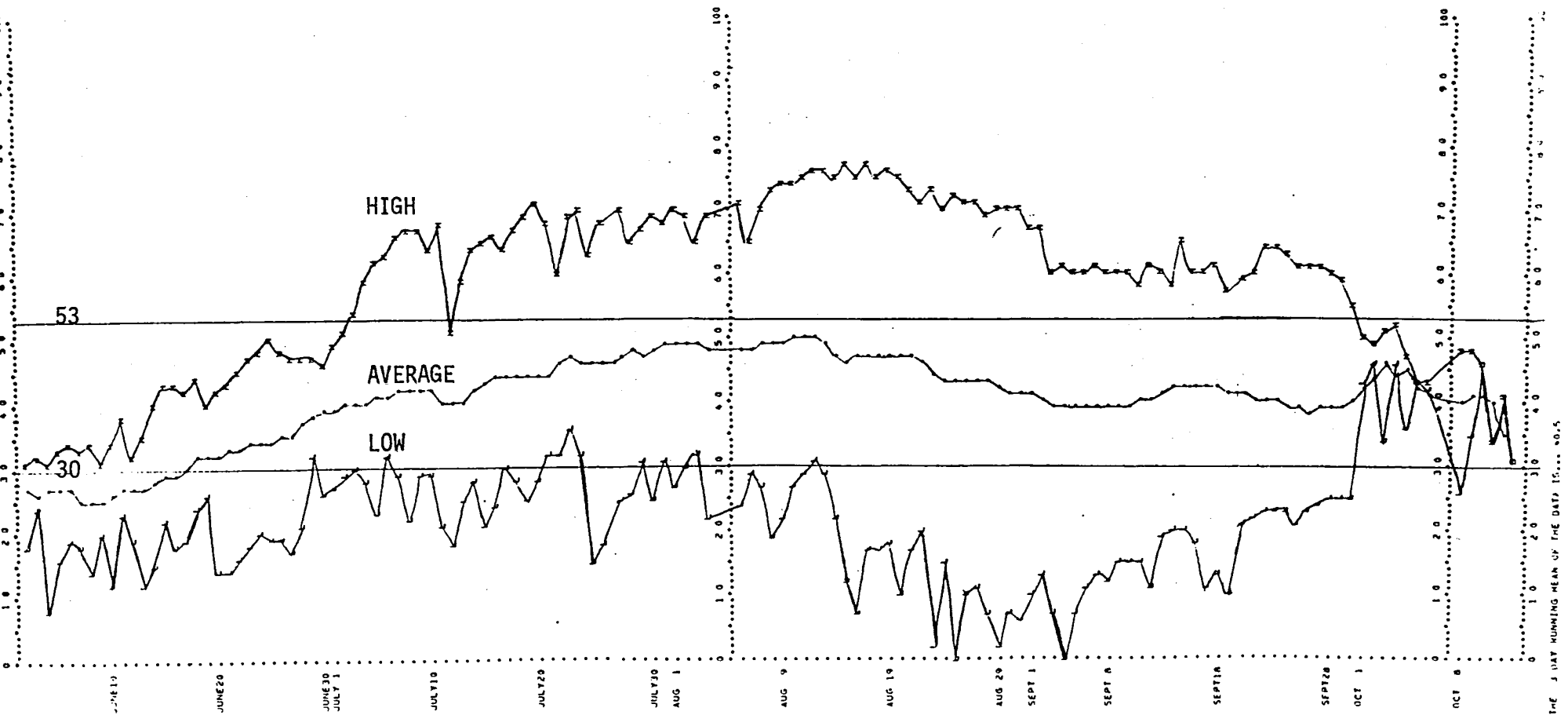


Figure 13. Frequency distribution for the energy release component 1967-1977.

TROY		FREQUENCY DISTRIBUTIONS (FRQOUT)		- 1978 NFDR		12 JUNE 78		PAGE 46	
240112		MODEL-SLOPE-HERB G-3-P		CLIMATE 2		ELEV-LAT= 1950-47		FIRE SEASON 5/ 1 THRU 10/31	
ENERGY RELEASE		TOTAL NO OF DAYS		1263		NO OF CLASSES		40	
		STEP SIZE						2	
CLASS NO.	UPPER BOUNDRY	NO. IN CLASS	RELATIVE FREQ	CUMULATIVE FREQ	90.%= 60.56 97.%= 68.92				
1	0	2	.2	.2					
2	2	2	.2	.3					
3	4	0	.0	.3					
4	6	1	.1	.4					
5	8	7	.6	1.0					
6	10	4	.3	1.3					
7	12	9	.7	2.0					
8	14	12	1.0	2.9					
9	16	12	1.0	3.9					
10	18	21	1.7	5.5					
11	20	23	1.8	7.4					
12	22	30	2.4	9.7					
13	24	50	4.0	13.7					
14	26	45	3.6	17.3					
15	28	45	3.6	20.8					
16	30	66	5.2	26.0					
17	32	71	5.6	31.7					
18	34	66	5.2	36.9					
19	36	67	5.3	42.2					
20	38	68	5.4	47.6					
21	40	77	6.1	53.7					
22	42	61	4.8	58.5					
23	44	58	4.6	63.1					
24	46	44	3.5	66.6					
25	48	53	4.2	70.8					
26	50	46	3.6	74.4					
27	52	60	4.8	79.2					
28	54	33	2.6	81.8					
29	56	26	2.1	83.8					
30	58	30	2.4	86.2					
31	60	41	3.2	89.5					
32	62	24	1.9	91.4					
33	64	24	1.9	93.3					
34	66	21	1.7	94.9					
35	68	16	1.3	96.2					
36	70	22	1.7	97.9					
37	72	11	.9	98.8					
38	74	5	.4	99.2					
39	76	8	.6	99.8					
40	78	2	.2	100.0					

Figure 14. Cumulative frequency plotted for the energy release component 1967-1977.

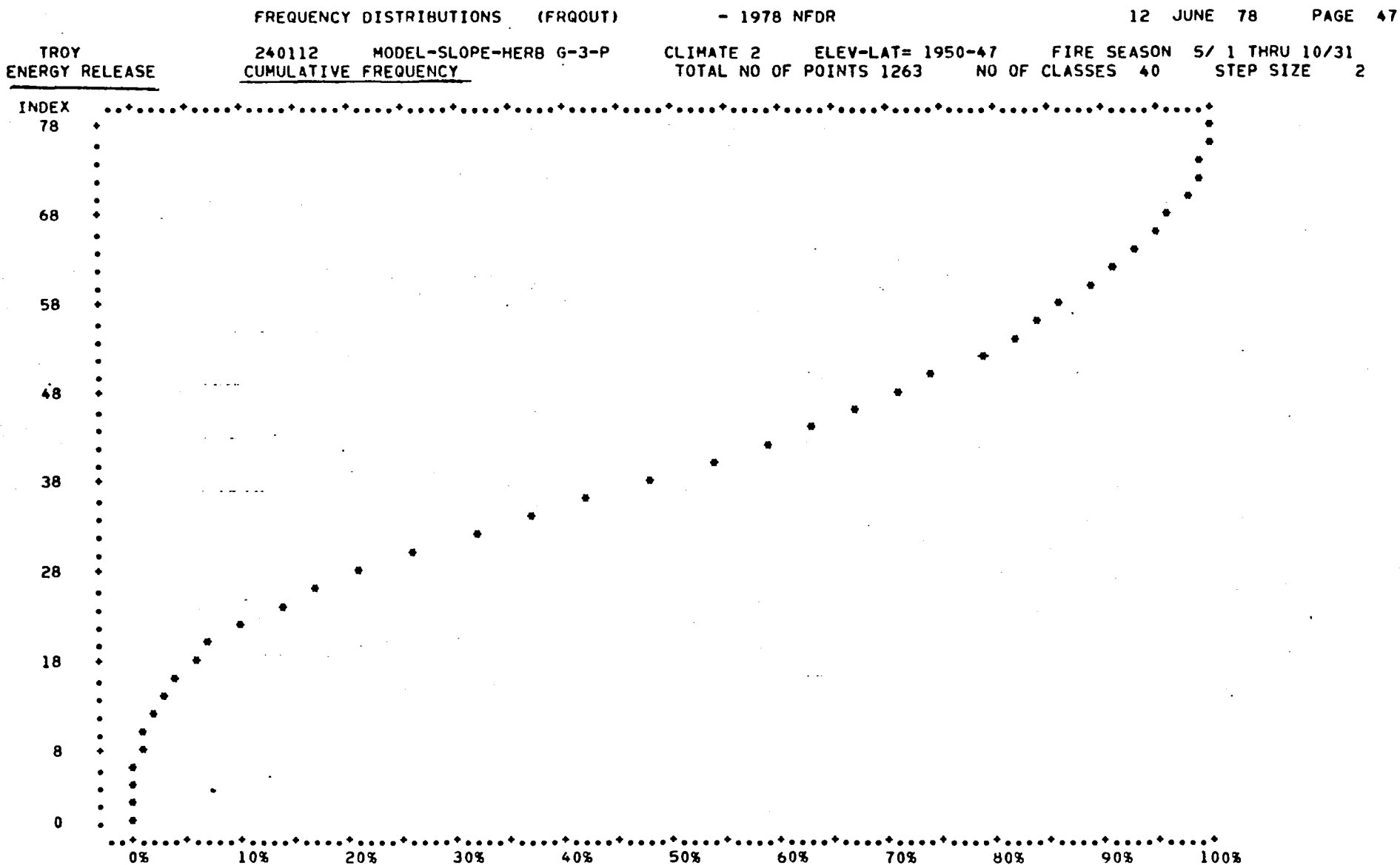


Figure 15. Burning index---1967 (B=daily; •=3 day running mean).

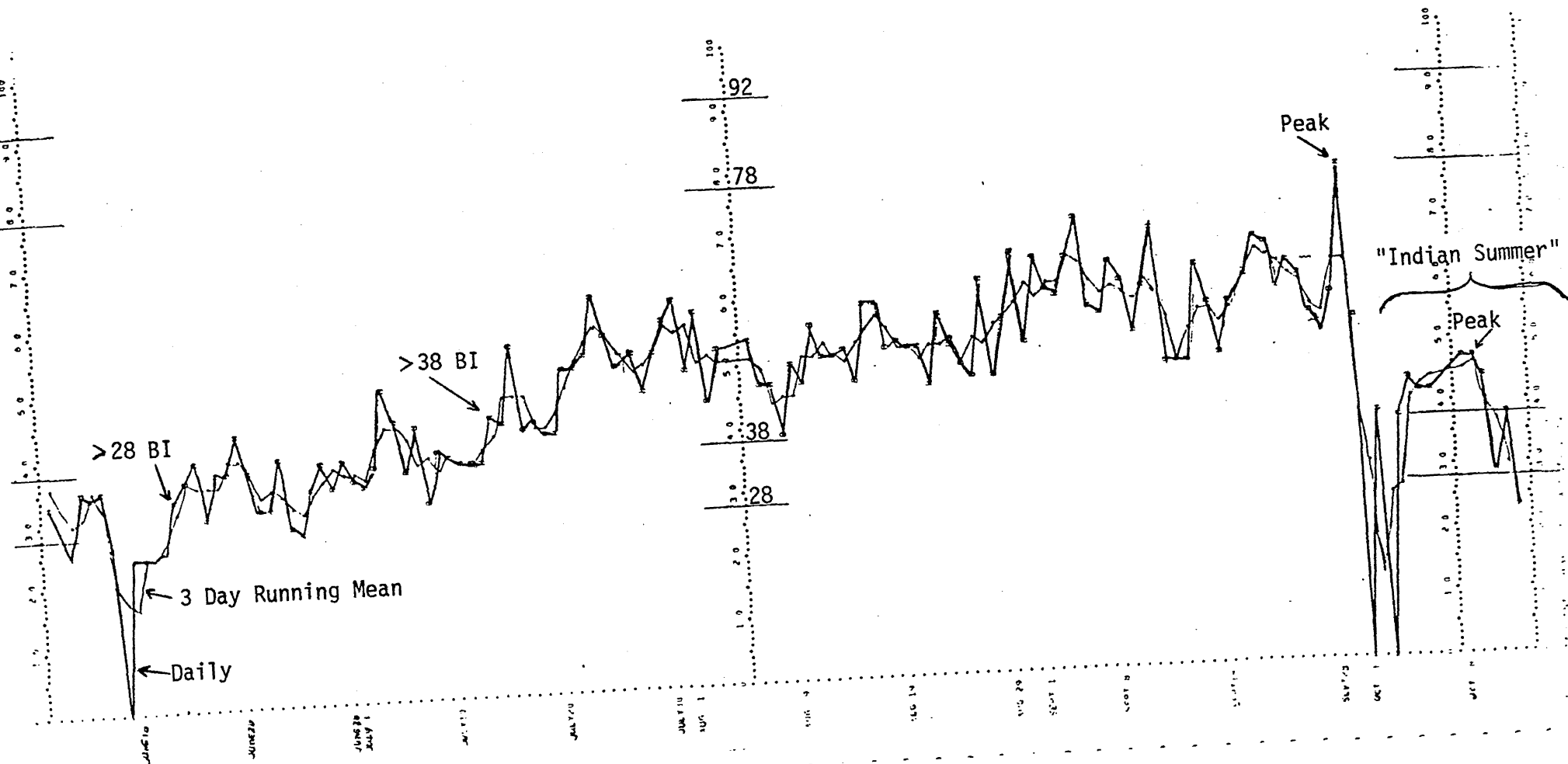


Figure 16. Burning index---1968.

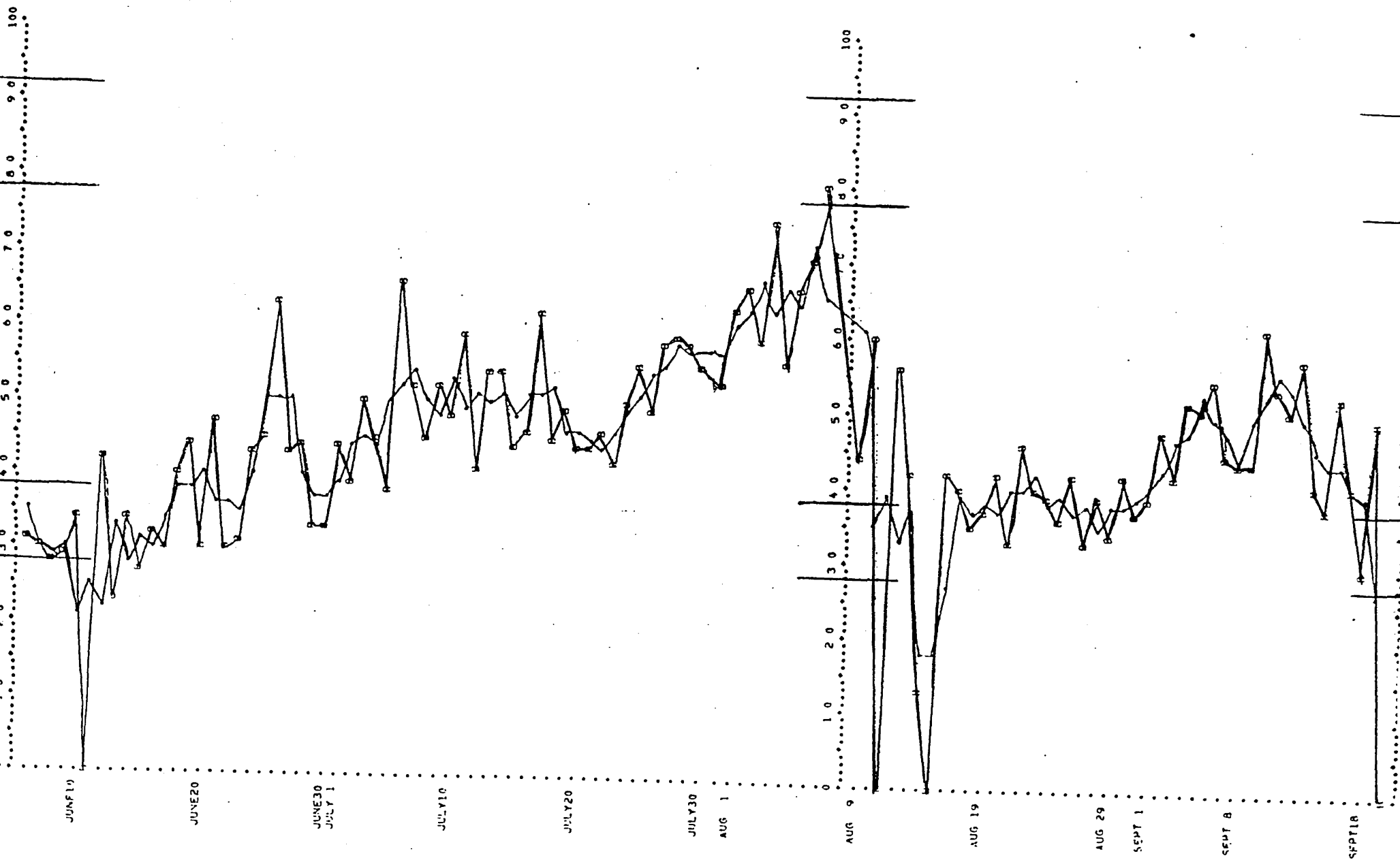
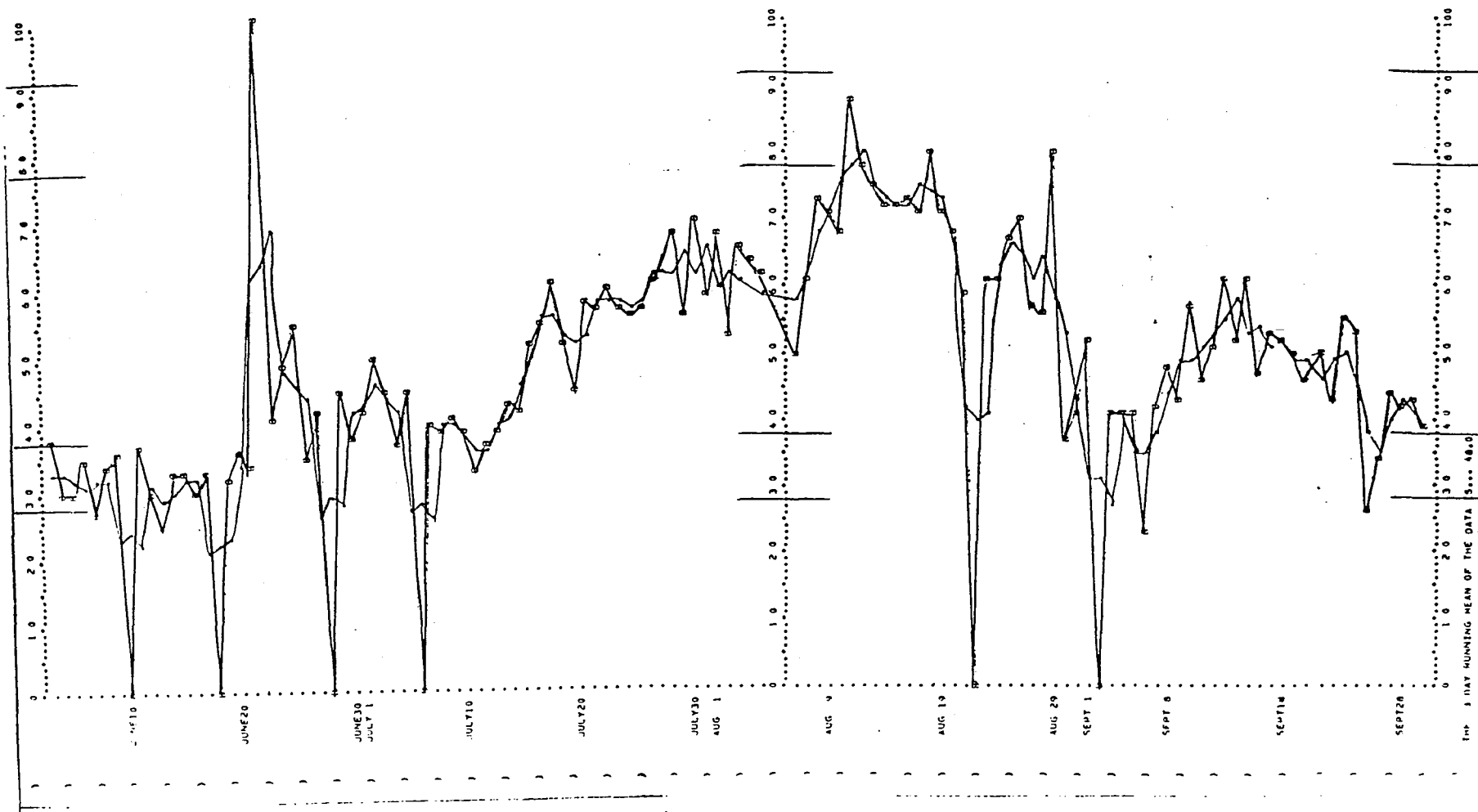
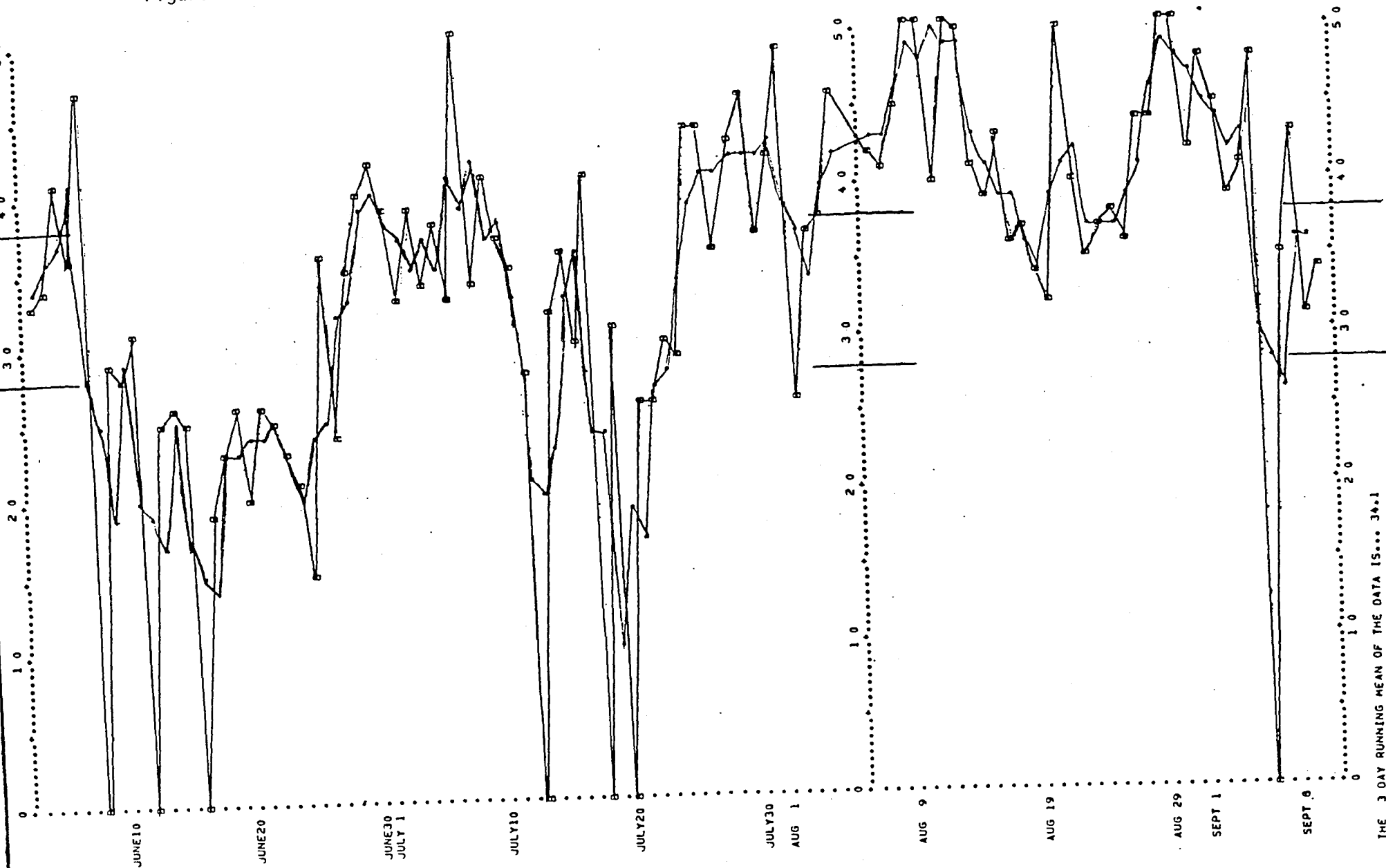


Figure 19. Burning index---1971.



THE 3 DAY RUNNING MEAN OF THE DATA

Figure 20. Burning index---1972.



THE 3 DAY RUNNING MEAN OF THE DATA IS... 34.1

Figure 21. Burning index---1973.

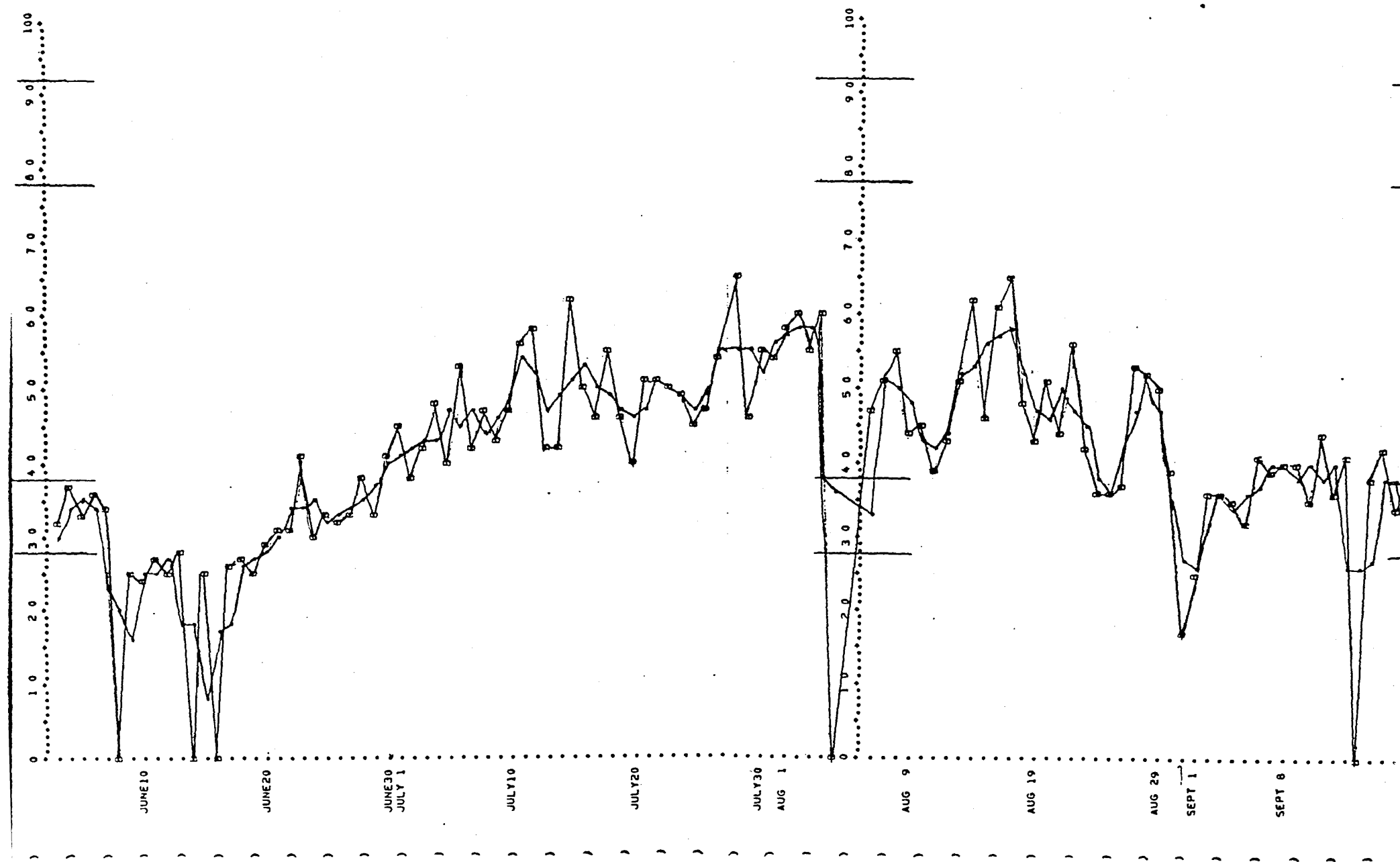


Figure 23. Burning index---1975.

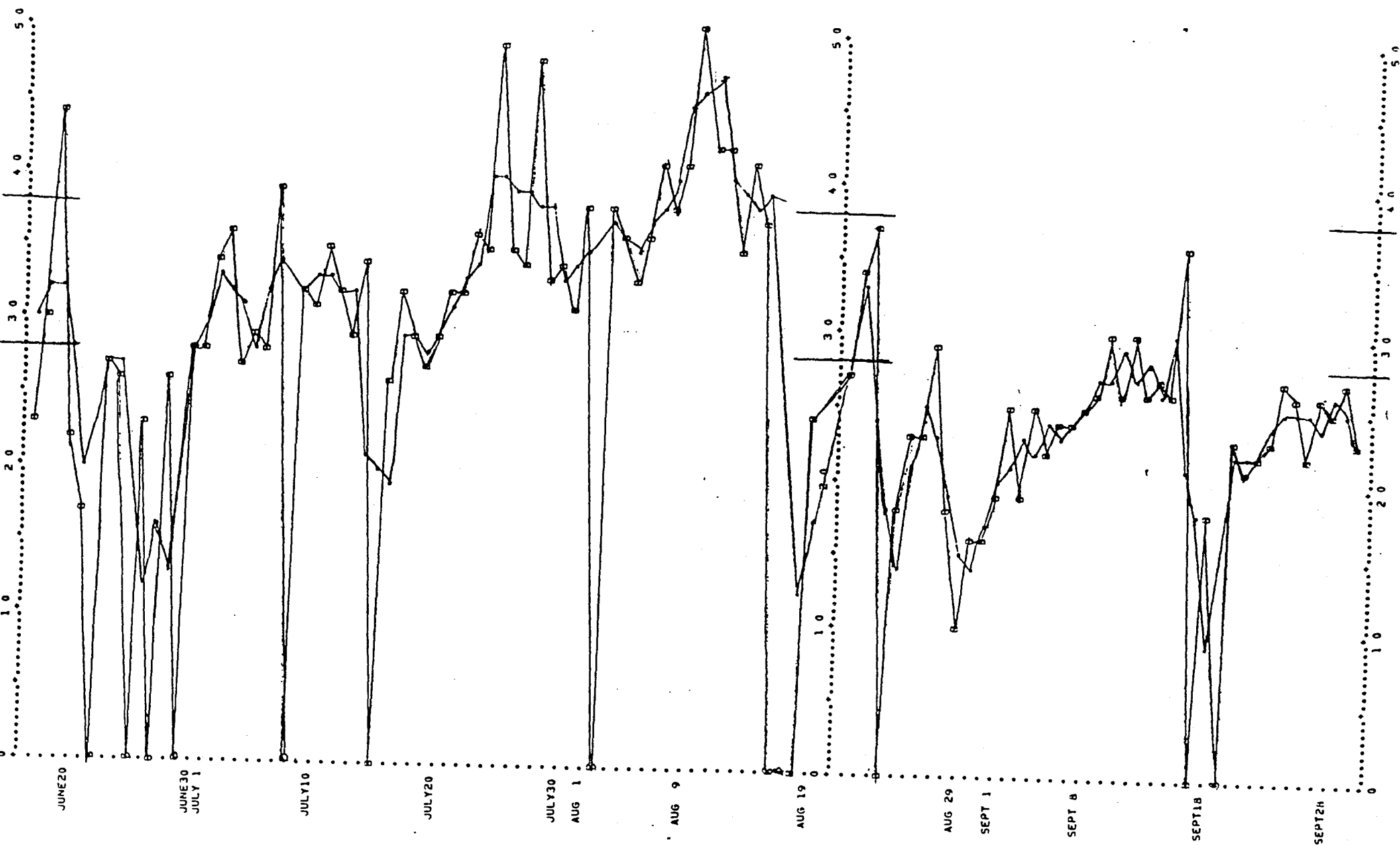


Figure 24. Burning index---1976.

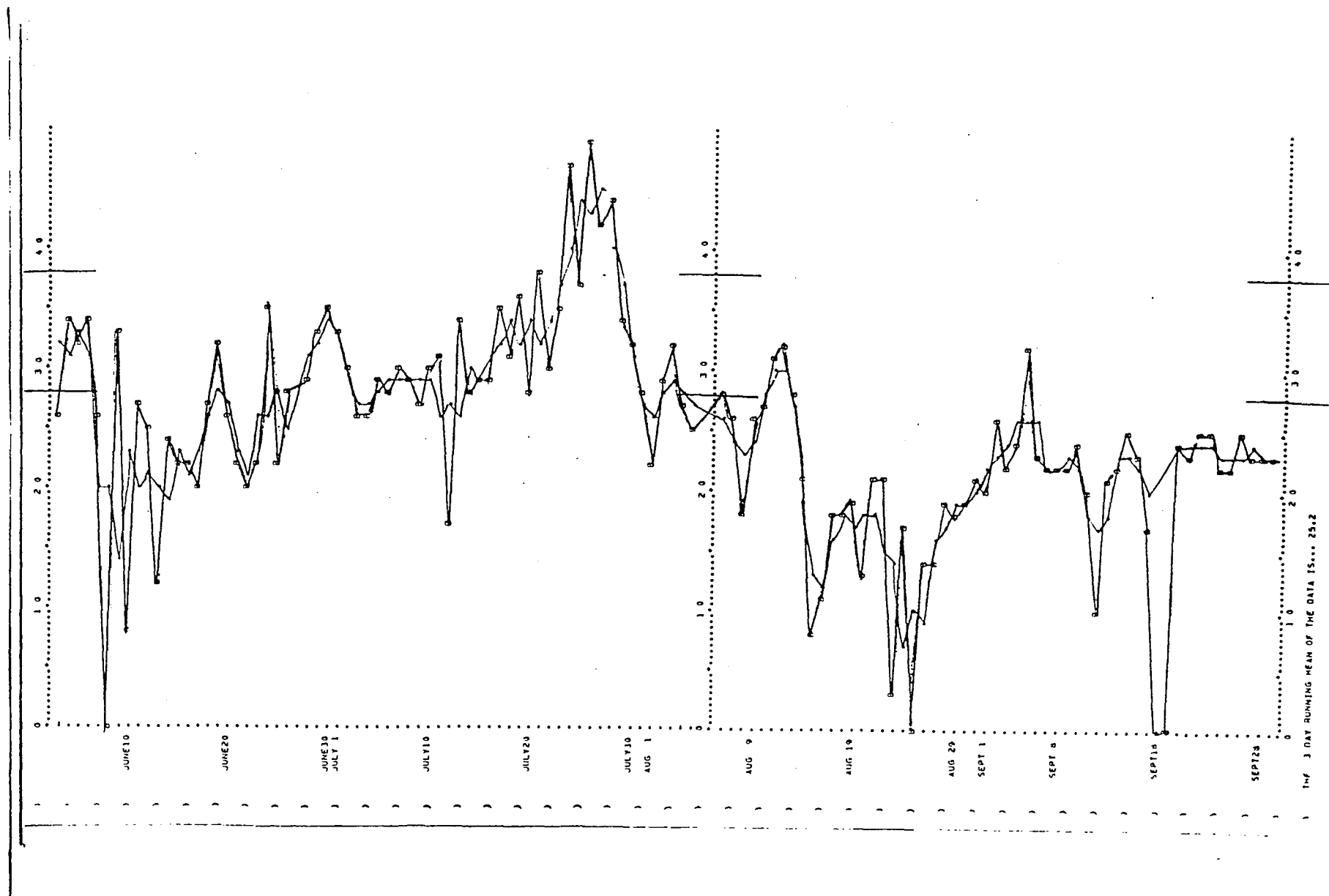


Figure 25. Burning index---1977.

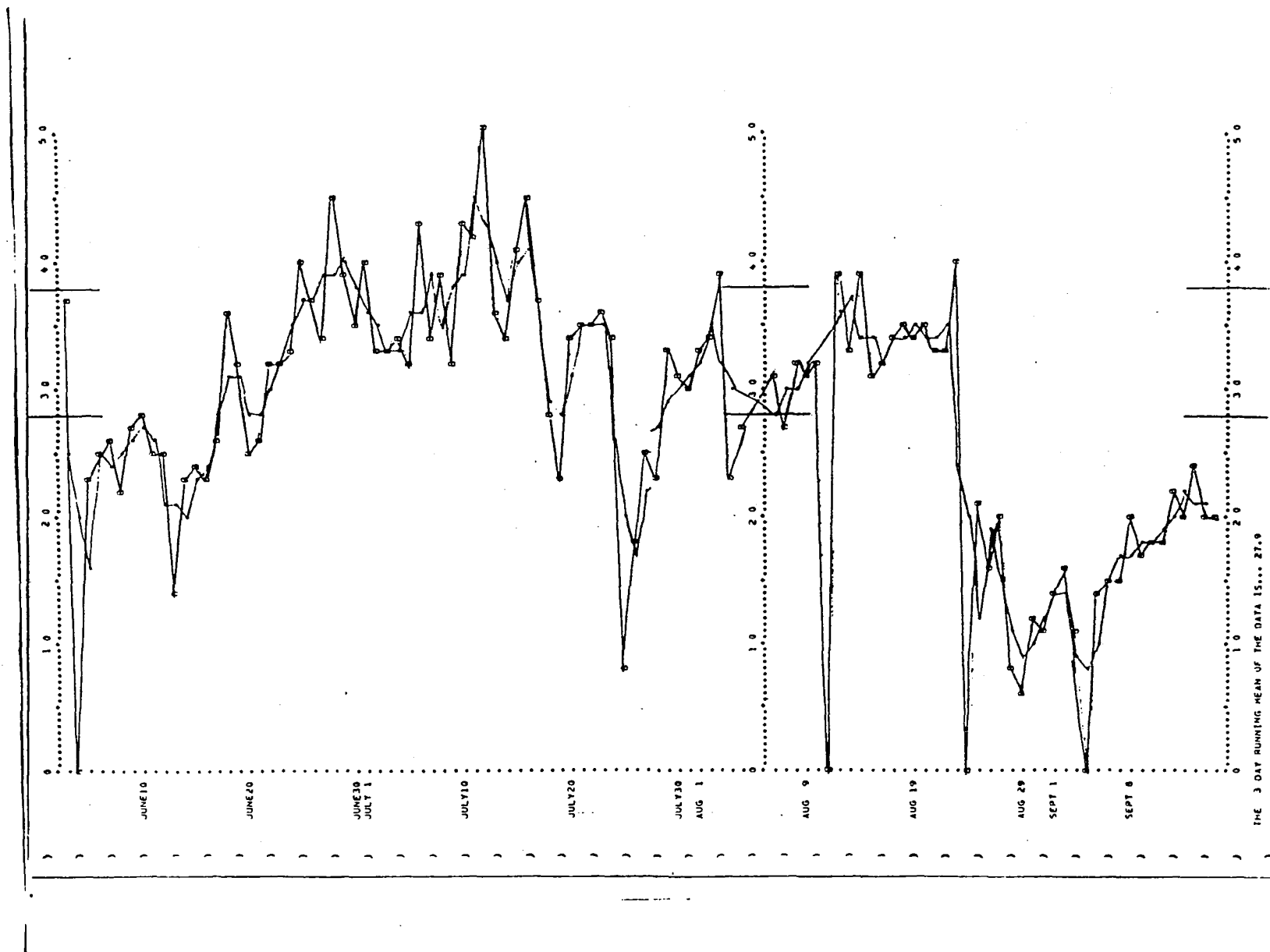


Figure 22. Burning index---1974.

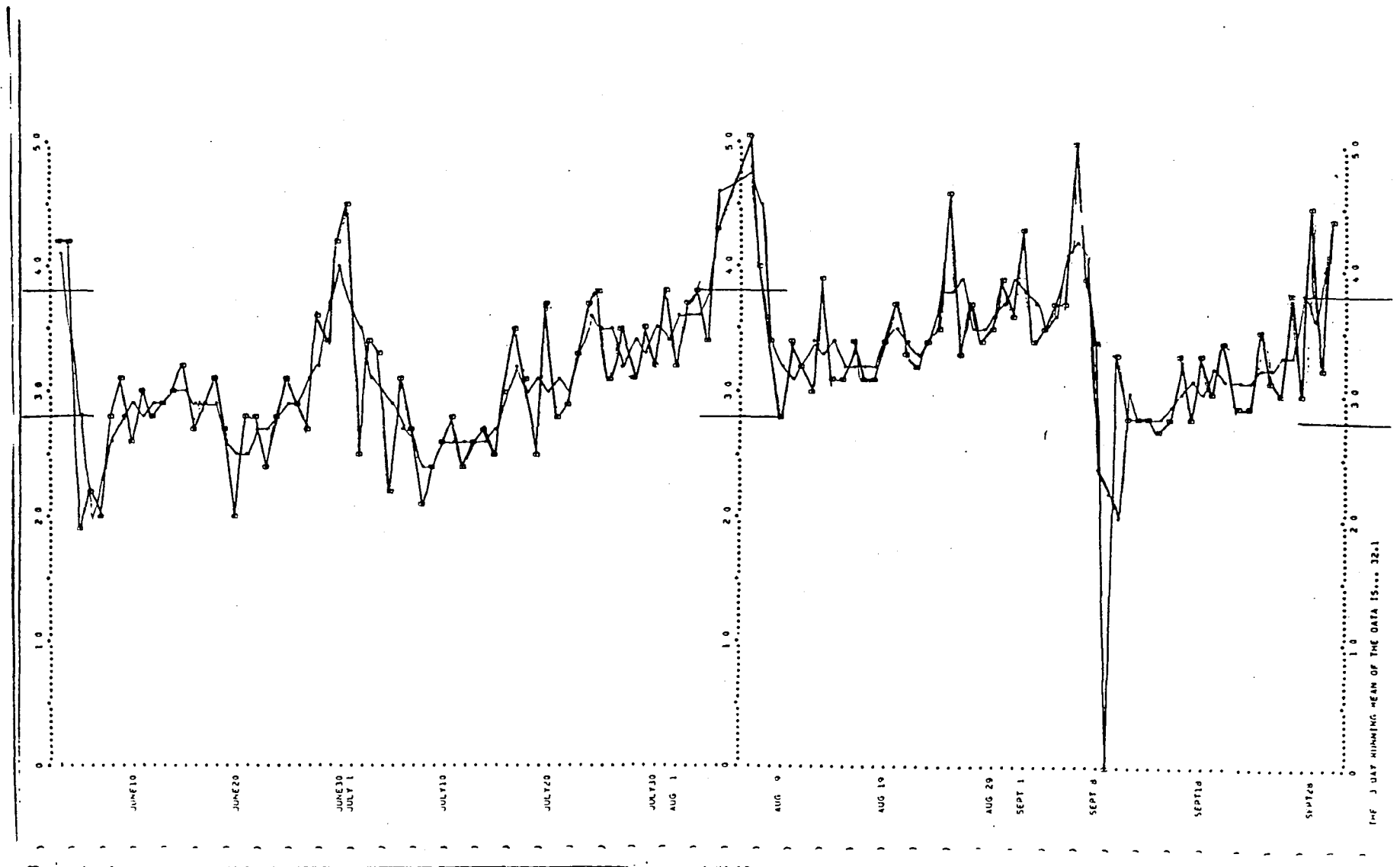


Figure 23. Burning index---1975.

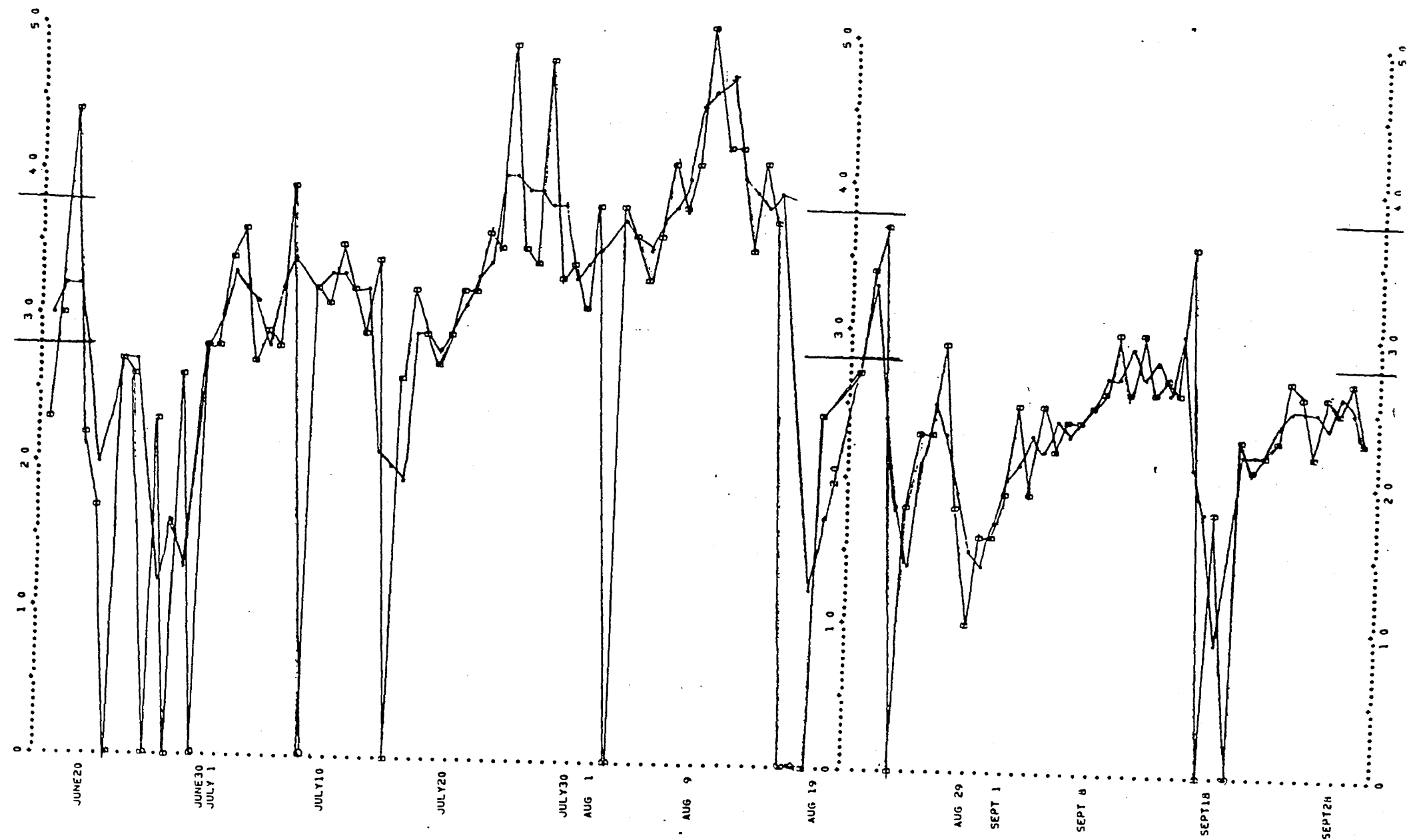


Figure 24. Burning index---1976.

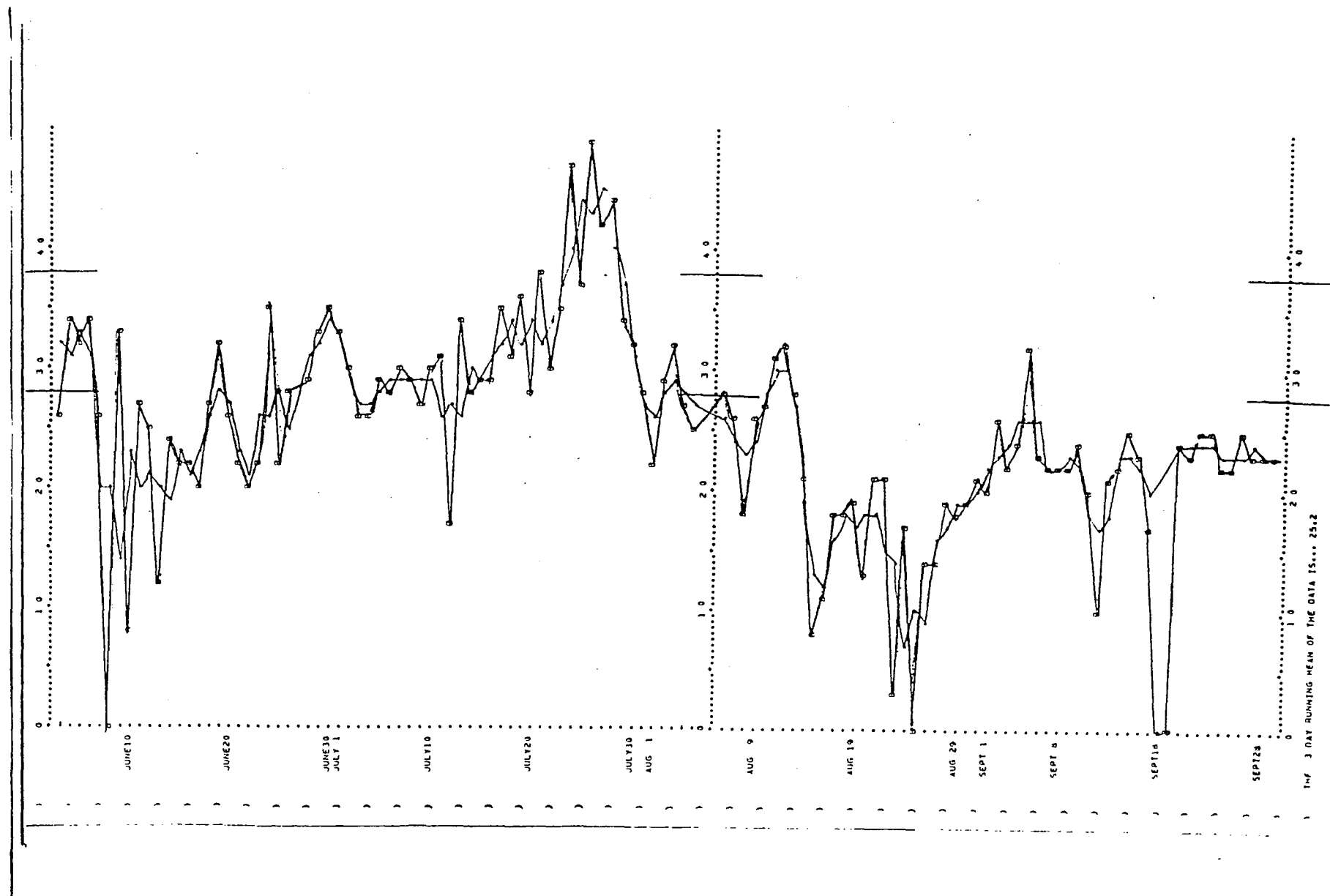


Figure 25. Burning index---1977.

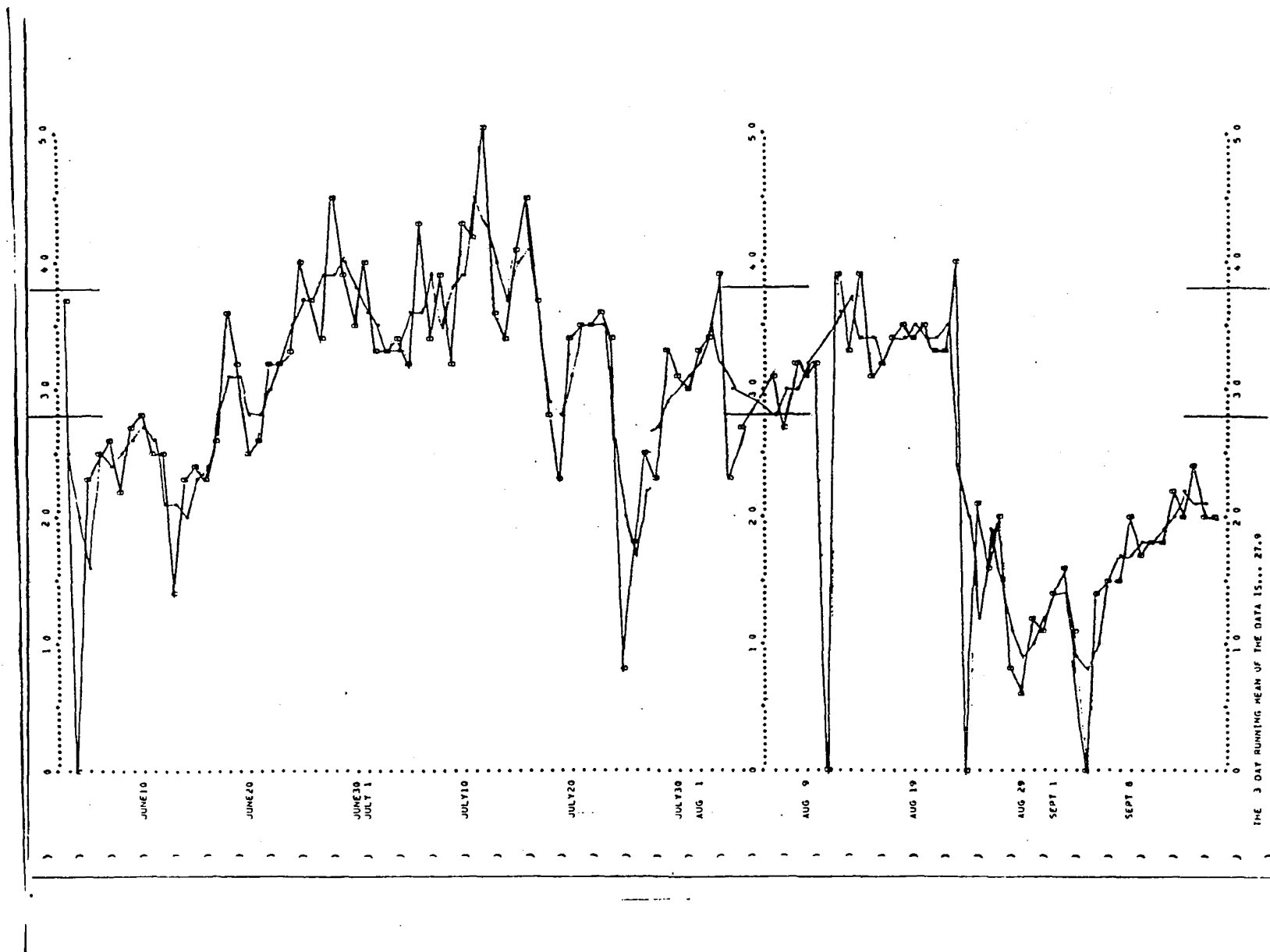
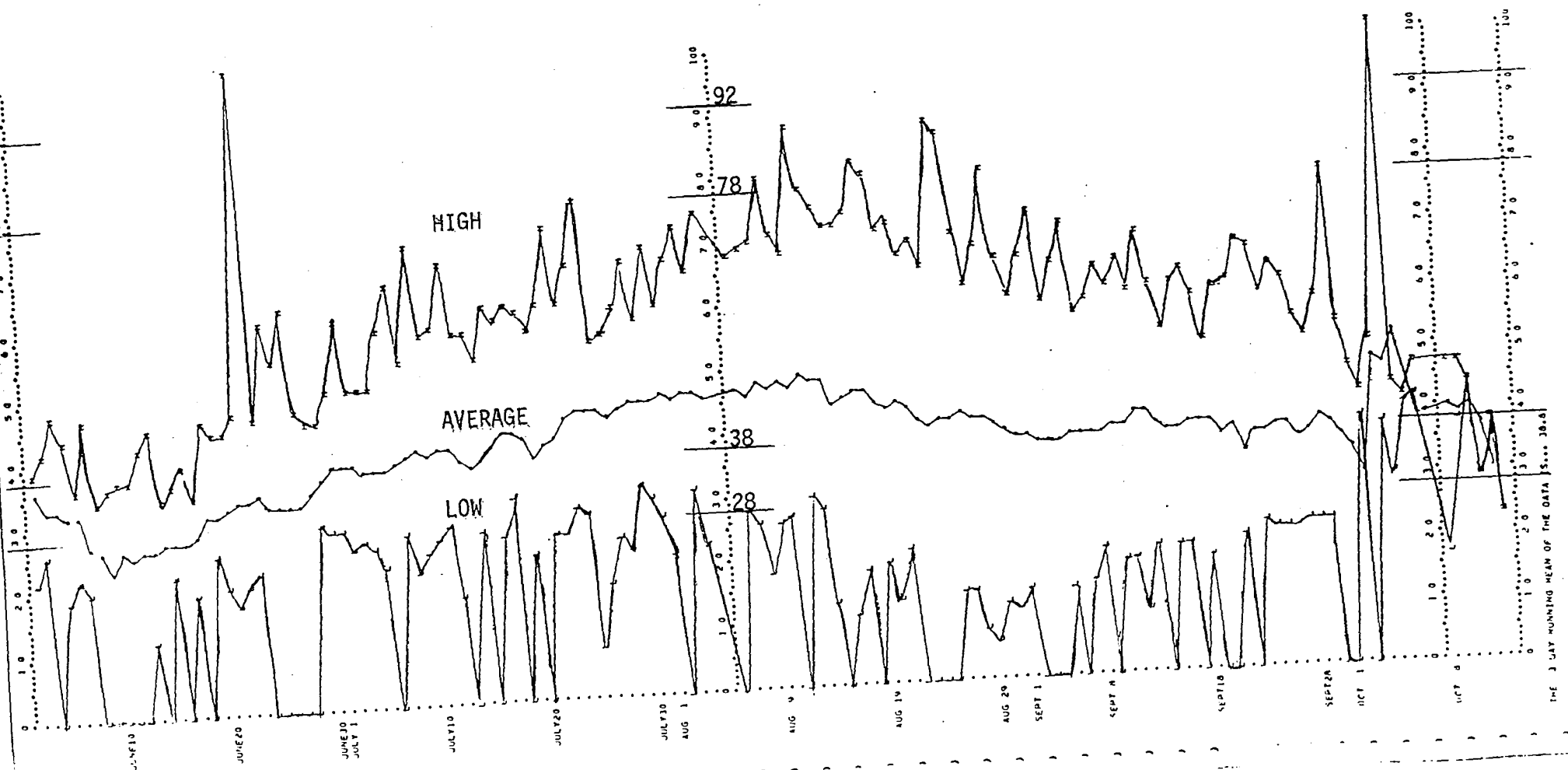


Figure 26. Burning index 1967-1977 (L=low; ●=average; H=high).



THE 3 DAY RUNNING MEAN OF THE DATA IS... 38.8

Figure 27. Frequency distribution for the burning index 1967-1977.

FREQUENCY DISTRIBUTIONS (FRQOUT)

- 1978 NFDR

12 JUNE 78 PAGE 48

TROY

240112

MODEL-SLOPE-HERB G-3-P

CLIMATE 2

ELEV-LAT= 1950-47

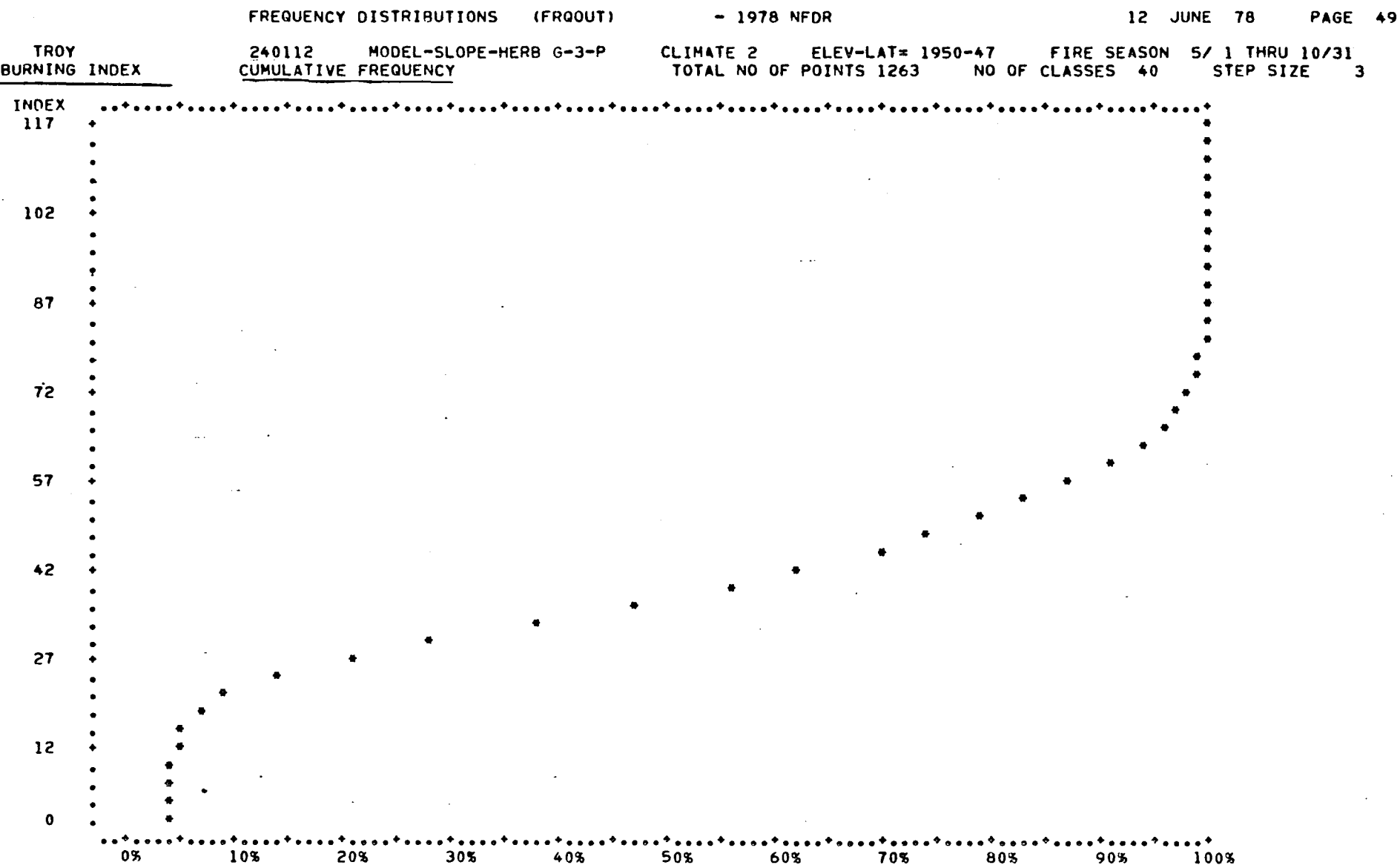
FIRE SEASON 5/ 1 THRU 10/31

BURNING INDEX

TOTAL NO OF DAYS 1263 NO OF CLASSES 40 STEP SIZE 3

CLASS NO.	UPPER BOUNDARY	NO. IN CLASS	RELATIVE FREQ	CUMULATIVE FREQ	90.%= 59.12 97.%= 68.27
1	0	45	3.6	3.6	
2	3	1	.1	3.6	
3	6	1	.1	3.7	
4	9	4	.3	4.0	
5	12	7	.6	4.6	
6	15	10	.8	5.4	
7	18	21	1.7	7.0	
8	21	28	2.2	9.3	
9	24	63	5.0	14.3	
10	27	90	7.1	21.4	
11	30	89	7.0	28.4	
12	33	120	9.5	37.9	
13	36	119	9.4	47.3	
14	39	104	8.2	55.6	
15	42	83	6.6	62.2	
16	45	93	7.4	69.5	
17	48	59	4.7	74.2	
18	51	55	4.4	78.5	
19	54	56	4.4	83.0	
20	57	54	4.3	87.3	
21	60	49	3.9	91.1	
22	63	37	2.9	94.1	
23	66	25	2.0	96.0	
24	69	16	1.3	97.3	
25	72	12	1.0	98.3	
26	75	9	.7	99.0	
27	78	4	.3	99.3	
28	81	3	.2	99.5	
29	84	1	.1	99.6	
30	87	1	.1	99.7	
31	90	2	.2	99.8	
32	93	0	.0	99.8	
33	96	0	.0	99.8	
34	99	0	.0	99.8	
35	102	0	.0	99.8	
36	105	0	.0	99.8	
37	108	0	.0	99.8	
38	111	0	.0	99.8	
39	114	0	.0	99.8	
40	117	2	.2	100.0	

Figure 28. Cumulative frequency plotted for the burning index 1967-1977,



APPENDIX F. ERC and BI summaries for
Fuel Models G and I.

10 DAY AND MONTHLY SUMMARIES OF *** 1978 NFDRS BI ***

RELATIVE FREQUENCY OF OCCURRENCE OF DAILY VALUES (1500 MST)

TRY 9 5 (240112) 1960-1977

1978 NFDRS BI

NFDRS FUEL MODEL G, SLOPE CLASS 1

PERIOD	BELOW	10	20	30	40	50	60	70	80	90	AND ABOVE	N. DAYS	MEAN	SD	MEDIAN	RANGE
REGIONS	10	19	29	34	44	59	69	79	89	AND ABOVE						
JUN 1	4.5	44.3	47.7	3.4								98	19	6	19	4 - 36
JUN 11	4.8	52.4	35.2	6.7								105	19	6	18	3 - 33
JUN 21	3.4	37.9	45.7	11.2	1.7							115	22	7	21	7 - 45
JUL 1	.8	19.1	49.5	23.6	5.3	1.6						127	27	9	25	8 - 59
JUL 11		8.5	51.5	26.2	10.0	3.8						130	29	9	27	10 - 59
JUL 21		2.4	34.5	27.5	29.6	4.2	.7	.7				142	35	10	34	13 - 70
AUG 1	.7	12.3	25.9	23.2	15.7	15.9	2.9	1.4				138	35	14	33	8 - 75
AUG 11	2.2	13.0	32.6	18.1	13.9	11.6	6.5	1.4	.7			139	35	17	30	6 - 104
AUG 21	3.3	24.9	25.5	17.0	15.3	9.2	2.0	.7	1.3			153	31	15	28	0 - 82
SEP 1	2.2	23.0	31.9	19.3	14.1	8.1	1.5					135	30	13	27	0 - 68
SEP 11	4.6	15.7	29.5	28.7	13.9	5.6	.9					108	30	12	29	5 - 65
SEP 21		21.5	49.1	13.9	7.6	6.3	1.3	1.3				79	29	13	25	12 - 77
JUN	4.2	44.7	43.0	7.4	.6							309	20	7	19	3 - 45
JUL	.3	2.5	44.9	25.8	15.8	3.3	.3	.3				399	30	10	28	8 - 70
AUG	2.1	17.0	29.2	19.3	15.6	12.1	3.7	1.2	.5	.2		429	34	16	30	0 - 104
SEP	2.5	20.5	35.1	21.1	12.4	6.8	1.2	.3				322	29	13	27	0 - 77

10 DAY AND MONTHLY SUMMARIES OF *** 1978 NFDRS ERC ***

RELATIVE FREQUENCY OF OCCURRENCE OF DAILY VALUES (1500 MST)

TRY 9 5 (240112) 1960-1977

1978 NFDRS ERC

NFDRS FUEL MODEL G, SLOPE CLASS 1

PERIOD	BELOW	1	5	10	20	30	40	50	100	150	AND ABOVE	N. DAYS	MEAN	SD	MEDIAN	RANGE
REGIONS	1	4	9	15	29	39	49	99	149	AND ABOVE						
JUN 1			4.5	60.2	35.2							98	17	4	17	7 - 28
JUN 11			1.9	35.2	54.3	8.6						105	20	6	21	8 - 32
JUN 21			.9	19.8	39.7	39.7						115	25	7	25	7 - 38
JUL 1				5.5	24.4	49.6	15.7	4.7				127	32	9	33	14 - 58
JUL 11				1.5	18.5	49.2	23.8	6.9				130	36	9	35	17 - 65
JUL 21				.7	3.5	29.6	47.9	18.3				142	42	8	42	18 - 65
AUG 1				2.2	15.7	19.6	34.1	27.5				138	41	12	42	14 - 65
AUG 11			.7	3.5	15.7	31.9	23.9	23.2				138	40	15	38	7 - 69
AUG 21	.7	.7	.7	12.4	17.0	27.5	15.0	26.1				153	37	17	36	0 - 71
SEP 1			.7	5.9	28.9	35.6	11.9	17.0				135	34	13	33	5 - 65
SEP 11				11.1	25.9	29.6	13.0	20.4				108	34	13	33	9 - 56
SEP 21				2.5	31.6	36.7	12.7	16.5				79	35	12	33	18 - 60
JUN			2.3	36.5	43.4	17.8						309	21	7	22	7 - 38
JUL				2.5	15.0	42.4	29.8	10.3				399	37	10	37	14 - 65
AUG	.2	.2	.5	6.3	15.8	26.3	24.0	25.6				429	39	15	39	0 - 71
SEP			.3	6.4	28.5	33.9	12.4	18.0				322	34	12	33	5 - 65

1978 NFDRS ERC - 1978 NFDRS BI

PERCENT FREQUENCY OF CO-OCCURRENCE
GIVEN TO TENTHS PERCENT

TROY R 5 (240112) 1960-1977

NFDRS FUEL MODEL G+ SLOPE CLASS 1

** JUN **

ERC	1978 NFDRS BI											TOTAL
	BELOW	10	20	30	40	50	60	70	80	90	1	
	10	19	29	39	49	59	69	79	89	ABOVE	1	
<1	1											0.0
1 - 4	1											0.0
5 - 9	1	1.6	.6									2.3
10 - 19	1	2.6	23.9	9.4	.6							36.6
20 - 29	1		17.5	23.9	1.9							43.4
30 - 39	1		2.6	9.7	4.9	.6						17.8
40 - 49	1											0.0
50 - 99	1											0.0
100 - 149	1											0.0
>150	1											0.0
TOTAL	1	4.2	44.7	43.0	7.4	.6	0.0	0.0	0.0	0.0	1	100.0

ex. In June on 1.6% of the
309-day record period
The ERC was between 5
and 9 while the BI was
less than 10.

** JUL **

ERC	1978 NFDRS BI											TOTAL
	BELOW	10	20	30	40	50	60	70	80	90	1	
	10	19	29	39	49	59	69	79	89	ABOVE	1	
<1	1											0.0
1 - 4	1											0.0
5 - 9	1											0.0
10 - 19	1	.3	2.3									2.5
20 - 29	1		4.3	9.3	1.5							15.0
30 - 39	1		3.0	29.1	9.0	1.0	.3					42.4
40 - 49	1			6.5	14.0	8.0	1.3					29.8
50 - 99	1			1.3	6.8	1.8	.3	.3				10.3
100 - 149	1											0.0
>150	1											0.0
TOTAL	1	.3	9.5	44.9	25.8	15.8	3.3	.3	.3	0.0	0.0	100.0

** AUG **

ERC	1978 NFDRS BI											TOTAL
	BELOW	10	20	30	40	50	60	70	80	90	1	
	10	19	29	39	49	59	69	79	89	ABOVE	1	
<1	1											.2
1 - 4	1											.2
5 - 9	1											.5
10 - 19	1	.9	4.9	.5								6.3
20 - 29	1	.2	10.3	5.8	.5							16.8
30 - 39	1		1.9	17.9	6.1	.5						26.3
40 - 49	1			4.0	10.3	7.0	2.5			.2		24.0
50 - 99	1				2.6	8.2	9.5	3.7	1.2	.5		25.6
100 - 149	1											0.0
>150	1											0.0
TOTAL	1	2.1	17.0	28.2	19.3	15.6	12.1	3.7	1.2	.5	.2	100.0

** SEP **

ERC	1978 NFDRS BI											TOTAL
	BELOW	10	20	30	40	50	60	70	80	90	1	
	10	19	29	39	49	59	69	79	89	ABOVE	1	
<1	1											0.0
1 - 4	1											0.0
5 - 9	1	.3										.3
10 - 19	1	1.9	3.7	1.2								6.8
20 - 29	1		14.9	11.5	2.2							28.6
30 - 39	1	.3	1.9	18.3	10.2	3.1						33.9
40 - 49	1			4.0	4.7	3.4	.3					12.4
50 - 99	1				4.0	5.9	6.5	1.2	.3			18.0
100 - 149	1											0.0
>150	1											0.0
TOTAL	1	2.5	20.5	35.1	21.1	12.4	6.9	1.2	.3	0.0	0.0	100.0

10 DAY AND MONTHLY SUMMARIES OF *** 1978 NFDRS B1 ***

RELATIVE FREQUENCY OF OCCURRENCE OF DAILY VALUES (1500 MST)

1977-9-9 (2401121) 1960-1977

1978 NFDRS B1

NFDRS FUEL MODEL G+ SLOPE CLASS 3

PERIOD	10	20	30	40	50	60	70	80	90						
REGIONS	10	19	29	39	49	59	69	79	89	ABOVE	N. DAYS	MEAN	SD	MEDIAN	RANGE
JUN 1	2.3	15.4	43.5	18.2							98	25	6	24	6 - 39
JUN 11	1.9	15.2	57.5	15.2							105	24	6	24	4 - 38
JUN 21		14.7	47.3	30.2	5.4	.9					116	20	0	25	10 - 52
JUL 1		4.7	33.1	40.2	15.0	6.3	.8				127	33	9	32	11 - 67
JUL 11		2.1	20.3	48.5	15.4	4.2	3.8				130	37	10	35	15 - 68
JUL 21		.7	5.6	33.1	30.3	25.4	3.5	1.4			142	43	11	42	19 - 79
AUG 1		1.4	18.1	22.5	22.5	16.7	15.2	2.4	.7		138	44	15	43	12 - 83
AUG 11	.7	4.3	15.2	32.6	14.5	13.0	9.4	8.0	1.4	.7	138	43	18	38	8 - 107
AUG 21	2.0	5.9	22.9	26.1	12.4	15.7	11.1	2.0	2.0		153	40	17	35	0 - 89
SEP 1	2.2	1.5	32.5	25.9	16.3	11.9	8.1	1.5			135	38	15	34	0 - 76
SEP 11	3.6	3.5	32.7	10.9	23.6	10.2	3.6	1.8			55	37	14	37	6 - 72
JUN	1.3	15.2	58.9	21.7	2.6	.3					309	26	7	25	4 - 52
JUL		21.5	17.3	40.4	20.6	14.0	2.8	.5			399	38	11	36	11 - 79
AUG	.9	4.0	18.9	27.0	15.3	15.2	11.9	4.2	1.4	.2	429	42	17	39	0 - 107
SEP	2.6	2.6	32.5	21.6	17.4	13.7	6.8	1.6			198	38	14	35	0 - 76

10 DAY AND MONTHLY SUMMARIES OF *** 1978 NFDRS ETC ***

RELATIVE FREQUENCY OF OCCURRENCE OF DAILY VALUES (1500 MST)

1977-9-9 (2401121) 1960-1977

1978 NFDRS ETC

NFDRS FUEL MODEL G+ SLOPE CLASS 3

PERIOD	1	5	10	20	30	40	50	100	150						
REGIONS	1	4	9	19	29	39	49	99	149	ABOVE	N. DAYS	MEAN	SD	MEDIAN	RANGE
JUN 1			6.5	60.2	35.2						98	17	4	17	7 - 28
JUN 11			1.9	35.2	54.3	8.6					105	20	6	21	8 - 32
JUN 21			.9	19.8	37.7	19.7					116	25	7	25	7 - 38
JUL 1				5.5	24.4	49.6	15.7	4.7			127	32	9	33	14 - 58
JUL 11				1.5	18.5	49.2	23.8	8.9			130	35	9	35	17 - 65
JUL 21				.7	3.5	29.6	47.9	18.3			142	42	8	42	18 - 65
AUG 1				2.2	16.7	19.6	34.1	27.5			138	41	12	42	14 - 65
AUG 11			.7	3.6	16.7	31.9	23.9	23.2			139	40	15	38	7 - 69
AUG 21	.7	.7	.7	12.4	17.0	27.5	15.0	26.1			153	37	17	36	0 - 71
SEP 1			.7	5.9	28.9	15.6	11.9	17.0			135	34	13	33	5 - 65
SEP 11				9.1	34.5	25.5	10.9	20.0			55	34	13	32	10 - 54
JUN			2.3	36.6	43.4	17.8					309	21	7	22	7 - 38
JUL				2.5	15.0	42.9	24.8	10.3			399	37	10	37	14 - 65
AUG	.2	.2	.5	6.3	15.8	26.3	24.0	25.6			429	39	15	39	0 - 71
SEP			.5	6.8	30.5	32.6	11.6	17.9			198	34	12	33	5 - 65

1978 NFDRS EFC - 1978 NFDRS B1

PERCENT FREQUENCY OF CO-OCCURRENCE
GIVEN TO TENTHS PERCENT

TRD R S (240112) 1960-1977

NFDRS FUEL MODEL G, SLOPE CLASS 3

** JUN **

1978 NFDRS B1														
		10	20	30	40	50	60	70	80	90	I			
EFC	BELOW	10	19	29	39	49	59	69	79	89	ABOVE	I	TOTAL	I
1	1												0.0	1
1	4												0.0	1
5	9		.6	1.6									2.3	1
10	19		.6	12.8	21.7	1.6							35.0	1
20	29			1.0	31.1	11.3							43.4	1
30	39				6.1	8.7	2.6	.3					17.8	1
40	49												0.0	1
50	59												0.0	1
100	149												0.0	1
GE 150													0.0	1
TOTAL		1.3	15.2	58.9	21.7	2.6	.3	0.0	0.0	0.0	0.0	1	100.0	NUMBER OF DAYS 309

** JUL **

1978 NFDRS B1														
		10	20	30	40	50	60	70	80	90	I			
EFC	BELOW	10	10	10	10	10	10	10	10	10	AND	I		
		10	19	29	39	49	59	69	79	89	ABOVE	I	TOTAL	I
1	1												0.0	1
1	4												0.0	1
5	9												0.0	1
10	19												2.5	1
20	29												15.0	1
30	39												42.4	1
40	49												29.8	1
50	59												10.3	1
100	149												0.0	1
GE 150													0.0	1
TOTAL		0.0	2.5	19.3	40.4	20.6	14.0	2.8	.5	0.0	0.0	0.0	100.0	NUMBER OF DAYS 399

** AUG **

1978 NFDRS B1														
		10	20	30	40	50	60	70	80	90	I			
EFC	BELOW	10	10	10	10	10	10	10	10	AND	I			
	10	19	29	39	49	59	69	79	89	ABOVE	I	TOTAL	I	
1	1											.2	1	
1	4											.2	1	
5	9											.5	1	
10	19		.5	2.0	3.0							6.3	1	
20	29			.7	12.6	3.5	.2					16.8	1	
30	39				3.5	19.8	7.0					26.3	1	
40	49					3.7	11.9	7.5	.7		.2	24.0	1	
50	59						1.2	7.7	11.2	4.2	1.4	25.6	1	
100	149											0.0	1	
GE 150												0.0	1	
TOTAL		.9	4.0	18.9	27.0	16.3	15.2	11.9	4.2	1.4	.2	100.0	NUMBER OF DAYS	429

** SEP **

1978 NFDRS B1														
		10	20	30	40	50	60	70	80	90	I			
EFC	BELOW	10	20	30	40	50	60	70	80	90	I	AND	I	
	10	19	29	39	49	59	69	79	89	ABOVE	I	TOTAL	I	
1	1													
1	4											0.0	1	
5	9		.5									0.0	1	
10	19	1	1.6	2.6	2.1	.5						6.8	1	
20	29	1		25.8	4.2	.5						30.5	1	
30	39	1	.5	4.7	15.0	9.5	2.1					32.6	1	
40	49	1			1.1	6.8	3.7					11.6	1	
50	59	1				1.6	7.7	6.8	1.6			17.9	1	
100	149	1										0.0	1	
GE 150	1											0.0	1	
TOTAL	1	2.6	2.6	32.6	21.6	10.4	13.7	6.9	1.5	0.0	0.0	100.0	NUMBER OF DAYS	190

10 DAY AND MONTHLY SUMMARIES OF *** 1973 NFDRS ***

RELATIVE FREQUENCY OF OCCURRENCE OF DAILY VALUES (1500 MST)

1973-85 (240112) 1960-1977

1973 NFDRS-01

NFDRS FUEL MODEL 1, SLOPE CLASS 3

PERIOD	BELOW	10	20	30	40	50	60	70	80	90	AND ABOVE	N. DAYS	MEAN	SD	MEDIAN	RANGE
PERIOD	BEGINS	10	19	29	39	49	59	69	79	89	AND ABOVE					
JUN 1		2.3			6.5	4.5	2.3	9.1	12.5	64.3		88	97	28	103	12 - 150
JUN 11	1.0		1.4	1.0	1.4	4.8	3.8	3.8	10.4	71.4		105	104	33	116	9 - 180
JUN 21				1.7	1.7	1.7	3.4	2.6	7.4	81.9		116	121	36	141	37 - 226
JUL 1							3.9	.8	2.4	92.1		127	140	38	155	33 - 258
JUL 11					1.3	.8		.3	1.3	95.4		130	145	38	155	44 - 248
JUL 21						.7		.7	2.1	96.5		142	165	41	159	50 - 255
AUG 1				.7	1.4	.7	1.4	.7	4.3	90.5		138	162	53	181	33 - 294
AUG 11			2.2		1.4	.7		3.6	1.4	90.5		138	156	57	189	20 - 312
AUG 21				.7	.7	2.0	3.9	1.3	4.6	84.3		153	142	55	171	0 - 291
SEP 1	1.5		.7		.7	1.5	.7		4.4	90.4		135	138	46	150	0 - 247
SEP 11		3.6	1.9			1.0		3.6	5.5	83.5		55	181	45	142	17 - 220
JUN	.3	.6	.6	1.0	2.6	3.6	3.2	4.9	10.0	73.1		309	108	34	132	9 - 226
JUL				.3	.5	.5	1.3	.8	2.0	94.7		399	151	40	169	33 - 258
AUG	.9		.7	.5	1.2	1.2	1.9	1.9	3.5	88.3		429	153	56	186	0 - 312
SEP	1.1	1.1	1.1		.5	1.6	.5	1.1	4.7	88.4		190	136	46	158	0 - 247

10 DAY AND MONTHLY SUMMARIES OF *** 1973 NFDRS-ERC ***

RELATIVE FREQUENCY OF OCCURRENCE OF DAILY VALUES (1500 MST)

1973-85 (240112) 1960-1977

1973 NFDRS-ERC

NFDRS FUEL MODEL 1, SLOPE CLASS 3

PERIOD	BELOW	1	5	10	20	30	40	50	100	150	AND ABOVE	N. DAYS	MEAN	SD	MEDIAN	RANGE
PERIOD	BEGINS	1	4	9	19	29	39	49	99	149	AND ABOVE					
JUN 1				1.1	1.1			1.1	12.5	49.9	35.2	88	132	43	134	8 - 210
JUN 11					1.0	1.9	1.0		17.1	26.7	52.4	105	145	55	154	16 - 262
JUN 21							.9	.9	9.5	20.7	68.1	115	173	59	184	34 - 282
JUL 1								.8	3.4	7.1	88.2	127	217	64	249	47 - 380
JUL 11									3.1	6.9	90.0	130	236	67	258	58 - 395
JUL 21									.7	1.4	97.9	142	272	57	264	71 - 385
AUG 1							.7	1.4	7.2	90.5		138	269	74	252	48 - 402
AUG 11				.7			.7	2.9	6.5	89.1		138	260	89	254	9 - 412
AUG 21		2.0				.7	.7	5.9	7.8	83.0		153	242	98	252	0 - 407
SEP 1	.7					.7		4.4	9.6	84.3		135	228	77	243	0 - 379
SEP 11					3.6	1.9		3.6	7.3	83.5		55	220	79	227	25 - 344
JUN	.3	.6	.6	.6	.6	.6	.6	12.9	30.7	57.4		309	152	56	157	8 - 282
JUL					.3	.5	.5	2.3	5.0	92.2		399	243	66	252	47 - 395
AUG	.7			.2	.2	.7	.7	3.5	7.2	87.4		429	257	40	252	0 - 412
SEP	.5				1.1	.5	.5	4.2	8.9	84.2		190	226	78	242	0 - 379

APPENDIX G. Fire mobilization plan (preparedness level) for the Northern Region (FSM 5120).

PREPAREDNESS LEVEL I
Typical Conditions

No Large Fires in Progress

No more than three Forests at Manning Class III. Forests not requiring assistance.

<u>Action</u>	<u>Assigned To</u>
1. Manning - All Forests will be manned at their initial attack level.	
2. Between June 15 and October 1 report daily by teletype status of all prescribed natural fires. The report will include:	
- Fire name	
- Location	
- Estimated acreage	
- Date started	
- Major changes since last report	

PREPAREDNESS LEVEL II

No Large Fire in Progress

Three or more Forests with Manning Class III+. Actionable fires susceptible to initial attack control although a few fires are escaping to B or C.

Large Fires in Progress

One Forest requiring some assistance including overhead, crews, and equipment.

<u>Action</u>	<u>Assigned To</u>
1. Daily situation report to Region via Regional teletype network.	Regional Coordinator
2. Manning - Normal Regional organization manned. All Forests will be manned at their normal Class III day manning.	Regional Coordinator and Forest Supervisors
3. Set up limited staging facilities at Aerial Fire Depot and make arrangements to implement Fort Missoula staging area on short notice.	Regional Fire Warehouse Superintendent
4. Consider installation of communication facilities for ROCO.	Regional Coordinator
5. Fire radios can be dispatched by warehousemen trained in fire cache radio dispatch by arrangement with radio technician.	Regional Fire Warehouse Superintendent

FIRE MOBILIZATION PLAN

PREPAREDNESS LEVEL III

No Large Fires in Progress

At least two Forests with other local agencies are requiring broad scale assistance. Actionable fires not susceptible to initial attack as evidenced by high number of C or D class fires. Lightning storms are causing a large number of fires each day. Two or more Forests are showing Class IV manning for at least the last 4 days. No break in weather predicted within 48 hours.

Large Fires in Progress

No more than three Classes D+ fires in progress.

Action

Assigned To

- | | |
|---|---|
| 1. Install ROCO facilities for offices and communication. | Regional Coordinator |
| 2. Activate on 24-hour duty ROCO positions 51, 53, 54, 54.4, 55, 3.1, in addition to positions already activated as needed. | Regional Coordinator |
| 3. Each of above positions will activate positions needed to meet demand. | Individual Coordinators |
| 4. Forest Supervisors should man their Forest Dispatching Office 7 days a week. | Forest Supervisors |
| 5. Alert BIFC of possible need for organized crews and overhead. | Regional Coordinator |
| 6. Alert Forests to place smoke chaser teams on standby. | Regional Coordinator |
| 7. Hold ROCO staff meetings each day at 0800. | ROCO Coordinators |
| 8. Prepare to recruit and train crews assigned in Level IV Preparedness Level. | Forest Supervisors |
| 9. Provide for communications assistance for all dispatch of fire communication equipment. | Regional Coordinator |
| 10. Evaluate program of prescribed natural fires in light of existing conditions. | Forest Supervisors and Director, Fire and Aviation Management |

FIRE MOBILIZATION PLAN

PREPAREDNESS LEVEL III (Cont.)

- | | |
|--|--|
| 11. Examine status of prescribed natural fires as to whether to continue or extinguish. | Director, Fire and Aviation Management, and Forest Supervisors |
| 12. Allow new start of prescribed natural fire to proceed only after consultation with Director, Fire and Aviation Management. | Director, Fire and Aviation Management, and Forest Supervisors |

PREPAREDNESS LEVEL IV

No Large Fire in Progress

Three or more Forests are indicating a Class IV Manning Class. Drought conditions exist in a significant part of the Region.

Large Fires in Progress

More than three Class D or larger fires in the Region in progress.

Action

Assigned To

- | | |
|---|---|
| 1. Daily briefing and strategy meeting at 0800 and 2000. | ROCO Coordinators |
| 2. Activate all ROCO positions on a 24-hour basis. | Individual Coordinators |
| 3. Request Forests to recruit, train, and place crews on 8-hour per day standby status. Crew quotas are assigned as follows: | Regional Coordinator and Forest Supervisors |
| Bitterroot 2 | Helena 2 |
| Clearwater 2 | Idaho Panhandle 4 |
| Custer 3 | Kootenai 2 |
| Deerlodge 3 | Lewis & Clark 3 |
| Flathead 2 | Lolo 2 |
| Gallatin 1 | Nezperce 2 |
| | TOTAL 28 |
| 4. Regional Fire Cache furnish equipment for above crews. | Regional Fire Warehouse Superintendent |
| 5. Forests report daily overhead, crew, and aircraft availability via teletype. | Forest Dispatcher |
| 6. Intensify coordination efforts with all fire protection agencies in the Region. Keep informed of their problems and activities and advise them of our situation by telephone and teletype. | Regional Coordinator |

APPENDIX H. Form to be used by the evaluator and monitor when reporting the behavior of management fires.

14-4100-5
(1/79)

Name of Fire _____
Ranger's Fire # _____ Supervisor's Fire # _____
Discovered by _____ Time _____ Date _____

Geographical Location _____
BLOCK/AREA _____ Legal T _____ R _____ S _____
AZIMUTH _____ (From) _____

Circle Best Descriptions

ALFA Character of Fire

1. Smoldering
2. Creeping
3. Running
4. Crowning
5. Spotting
6. Stationary (e.g., SNAG)

ECHO - Wind Speed

1. NONE
2. 1-5
3. 5-20
4. 20-40
5. 40+

BRAVO Estimated Size

1. Spot
2. 1/4 to 1/2
3. 1/2 to 3/4
4. 3/4 to 1
5. 1 to 5

FOXTROT - Wind Direction

1. Down Canyon a. North
2. Up Canyon b. South
3. Down Slope c. East
4. Up Slope d. West
5. Variable

CHARLIE - Fuel Type

1. Grass
2. Shrubs
3. Snag
4. Logs and Duff
5. Open Timber
6. Dense Timber
7. Logging Slash
8. Thinning Slash
9. Regeneration

GOLF - Exposure

1. North
2. South
3. East
4. West

HOTEL - Slope Percent

1. 0
2. 1-10
3. 10-20
4. 20-30
5. 30-40
6. 40+

INDIA - Position on Slope

1. Bottom
2. Lower 1/3
3. Middle 1/3
4. Upper 1/3
5. Top

DELTA - Adjacent Fuel

1. Grass
2. Shrubs
3. Snag
4. Logs & Duff
5. Open Timber
6. Dense Timber
7. Logging Slash
8. Thinning Slash
9. Regeneration

JULIETT - Estimated # Persons to Control

1. _____

KILO - Best System of Transportation

1. Vehicle
2. Helicopter (Landing Spot Closeby)
3. Jumpers

LIMA - Special Equipment Needs

1. Retardant
2. Ground tanker
3. Portable Pump
4. Dozer

METRO - Other Information

Reported to _____ Date _____ Time _____

APPENDIX I. Identified grizzly bear habitat in the
Cabinet Mountains (Erickson 1977).

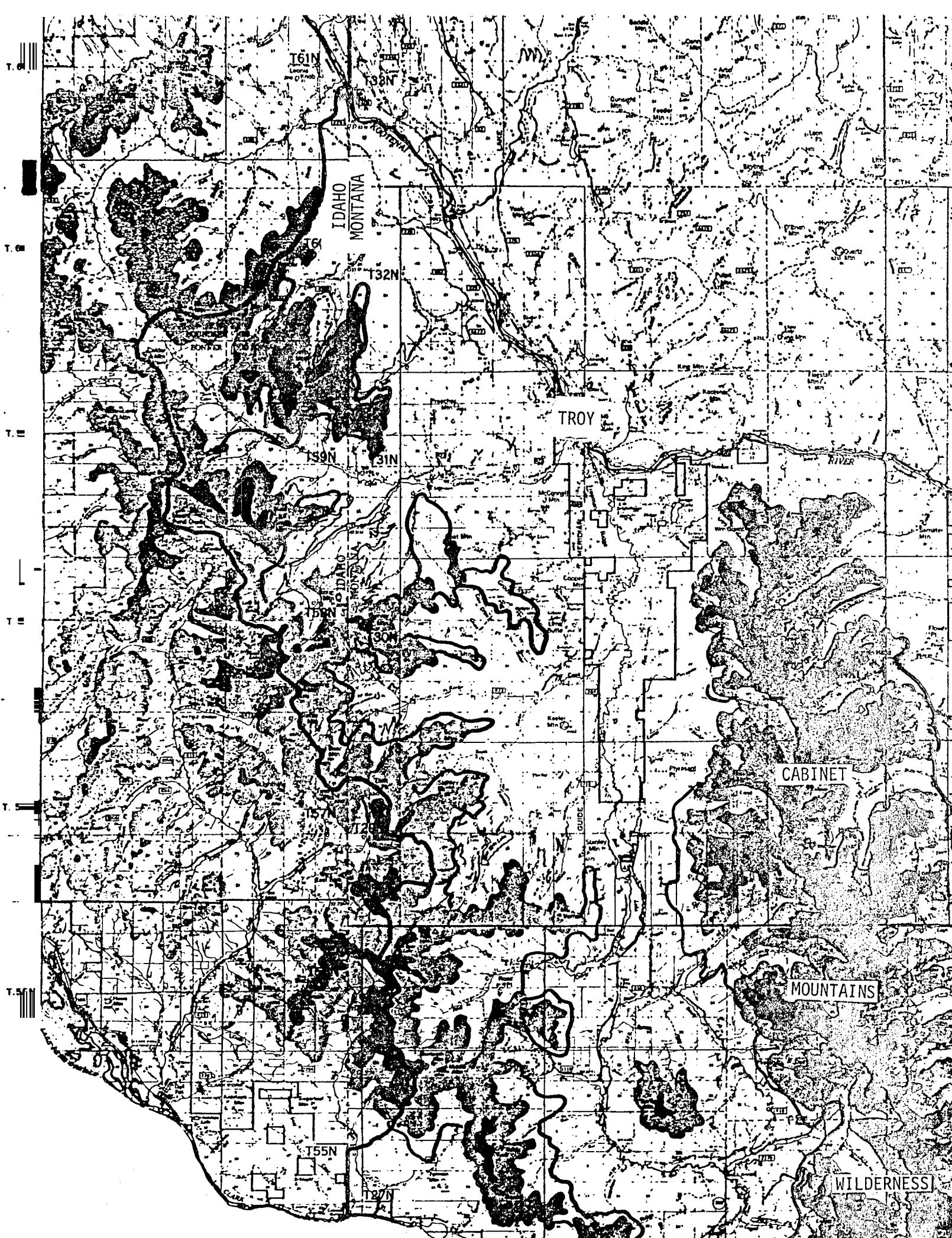


Habitat above 6000'



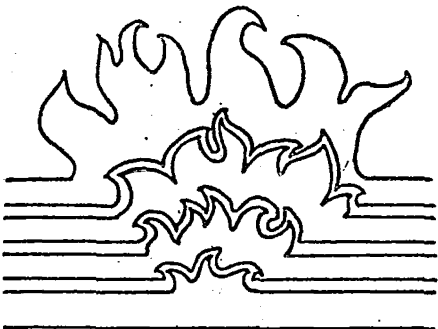
Habitat between 5000' & 6000'

Habitat below 5000'



APPENDIX J. Public information.

WHAT do you think about FIRE in your forests?



The information in this pamphlet is designed to acquaint you with the fire management program and fire planning process on the Troy Ranger District, Kootenai National Forest. We would like you to review this pamphlet and tell us what you think about fire in your forests? Feel free to stop by the Troy Ranger Station weekdays from 8:00 a.m. to 4:30 p.m. to discuss with the District Fire Management Officer the details of fire management planning on the Troy District or write P. O. Box E, Troy, MT 59935.

Thanks for your interest and we would appreciate your comments.

Northern Region
U.S. Forest Service
Kootenai National Forest
Troy Ranger District



NATURAL ROLE OF FIRE



Fire is a natural agent which brings change to forests. Mature stands burn and are replaced by young trees; frequent, repeated fires create shrubfields where once there were trees; recurrent light ground fires keep stands of mature trees open and free from thickets of young trees. Changes in vegetation occur with more

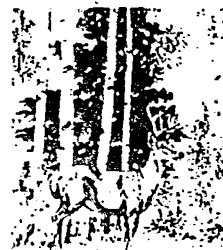
overall changes because there are more than trees in a forest. A forest is a complex ecosystem of plants, animals, microbes, soil, minerals, nutrients, water, and air that live together in competition with and interdependence on each other. Because all parts are interrelated, no one part can be changed without having an effect throughout the ecosystem. Fire created changes result in both relief and stress, but fires that have occurred for thousands of years have created a balance between relief and stress because forest ecosystems recover.

Fires of varying severity have burned and reburned forests in the Northern Rockies for thousands of years. The frequency of recurrent fires depends on the climate, topography, existing vegetation, fuels, and other factors. For instance, ponderosa pine forests growing on a dry site often have light ground fires every 30 to 40 years which limit the number of young trees and keep fuels low. In contrast, mature cedar-hemlock forests growing on moist sites would normally have severe fires at 300 to 600 year intervals.

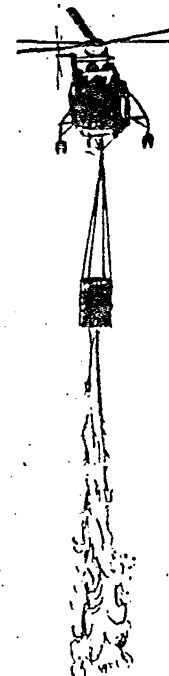
Most plants have adjusted to periodic fires by developing features such as thick bark, high branches, large seed supply, root suckering, and cones that require heat to open. Tree species most adapted to frequent fires grow best on a burned area soon after the fire. Lodgepole pine, western larch, ponderosa pine, and Douglas-fir benefit from increased nutrients, soil free from litter, ample sunshine, and reduced competition from other plants. In contrast, spruce, subalpine fir, grand fir, western hemlock, and western red cedar, which prefer partial shade and plenty of moisture, can grow successfully under the canopy of trees which followed the fire. Nearly all of the shrubs and herbs in our forests resprout from root suckers after fire.

Wildlife is directly affected by the heat and smoke of fire as well as indirectly influenced by the resulting vegetation changes. The animals of the Northern Rocky Mountains, like the plants, have evolved with fire. A burn that destroys the habitat of one animal creates a home for another. Fire is an important agent of a diverse ecosystem and diversity provides food, cover, and homes for more wildlife.

Have a good look around the forests. Mosaic patterns of the vegetation, snags standing above shrubfields and even-aged trees, fire-scarred trees, charred wood, and charcoal in the soil are all evidence of the natural role of fire.



WILDFIRE



Wildfires are unplanned fires which require suppression action. Uncontrolled wildfire raging through a forest can have disastrous effects. This is the type of wildfire that will be discussed.

Healthy trees, hundreds of years old, are reduced to blackened snags. Shrubs that provide food and cover for wildlife become ashes. Under the intense heat some soil nutrients are vaporized and become airborne in clouds of smoke.

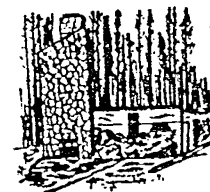
By reducing vegetation, wildfires impair the ability of watersheds to absorb rainfall and retain runoff. Storm runoff is greatly accelerated when fires destroy vegetation on steep slopes.

Birds and other animals are killed when wildfire strikes. Water temperatures rise and kill large numbers of fish. Wood ashes washed into streams and lakes can destroy water life.

Wildfires can ruin tourists' and recreation businesses by blackening forests and polluting water. Services and businesses are disrupted by fire when telephone and electric lines are destroyed and when highways are blocked or demolished.

However, periodic raging wildfires have had a definite role in the development of our forest

and have had a greater ecological effect than moderate intensity fires. Evidence of intense fires occurring around Troy during the late 1880's and early 1900's can still be seen, but the once blackened landscape has changed into green and vigorous forests. We recognize that past wildfires have had significant beneficial effects on the forest, but because of increasing population, property values, and resource values on the Troy District, the Forest Service will continue to suppress wildfires.

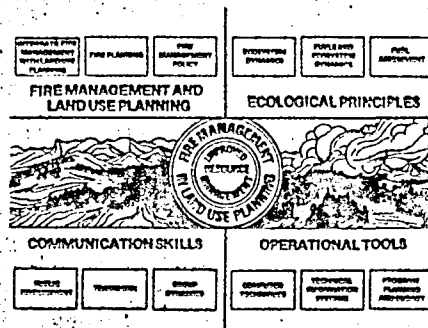


On the Troy District, over 2,000 acres are treated yearly with prescribed fire. Broadcast and pile burning of logging slash are used for fire hazard reduction, site preparation, and reforestation. Underburning (burning under a stand of timber) is also being used for hazard reduction, insect and disease management, and wildlife habitat improvement. Underburning is used on the Kootenai Falls Sheep Range between Troy and Libby, Montana, to improve the quality of the forage on the bighorn sheep winter range.



REVISED FIREPOLICY

Implementation of the revised policy has already begun and will be completed nationally by 1983 for all National Forest lands.



FIRE MANAGEMENT PLAN

In specified areas, fires which fit a predetermined prescription will be permitted to burn when they fulfill a management objective. Fire prescriptions are based primarily on weather, fire behavior, air quality, safety for life and property, and time of year.



1. Protected areas— State and private lands will continue to have an immediate fire suppression policy because of life and property values. Fire can be used by landowners having special permits.

2. **Operational areas**—Prescribed burning will be used on forested lands where Land Use Plans designate a special activity for resources, such as big game habitat and timber production. In addition, accidental fires will be allowed to burn when they fit a predetermined prescription and satisfy management objectives.
3. **Observation fire areas**—These are forested lands where no management activities are planned. These are primarily high elevation areas set aside for recreation, aesthetics, watershed, and wildlife habitat. Accidental fires will be allowed to burn when they fit a predetermined prescription and satisfy management objectives.
4. **Wilderness area**—The Cabinet Mountains Wilderness will have a plan allowing lightning-caused fires to assume a more natural role. Again, only fires fitting a prescription will be permitted to burn.
5. **Special areas**—Prescribed burning will be used on sites designated for special uses, such as campgrounds. However, accidental fires fitting a predetermined prescription will be allowed to burn to satisfy management objectives.

For reasons previously stated, the Troy District fire management plan does not include wildfires. The prescriptions are written to allow moderate ground fires which rejuvenate the forest by removing decaying plants, encouraging root suckering and seedlings, removing some litter, and reducing fuel loadings. The intent is to allow fire to function more naturally yet safeguard life, property, and forest resources.



Prescribed burning in April of the Kootenai Falls Bighorn Sheep Range located between Troy and Libby, Montana.



Help prevent violence.
Please use fire carefully.

The Western News, Libby, Mont., Thurs., Aug. 31, 1978—2

Forest Service Changes Fire Plan After 43 Years

By Bill Francis

For 43 years, the Forest Service has made a point of snuffing out every man-caused or nature-caused fire in the national forest system. But now that policy has changed.

The new Forest Service fire policy, which became effective early this year, will allow fire to play its role as a natural force. And by 1983, every forest in the national system will have fire plans that are "cost effective and responsive to land and resource management goals and objectives."

This doesn't mean that the Forest Service will stop dispatching smokejumpers and fire crews, but it does mean that when a fire is spotted it will be evaluated according to a fire plan. After that evaluation, a Forest Service official will decide to fight the fire or let it burn.

Presently, the only ranger

district on the Kootenai National Forest preparing a fire plan is the Troy Ranger District. Kathy Davis, Troy's Fire Management Specialist, is preparing the plan.

"We're kind of a trial district on the Kootenai National Forest," said Davis.

Davis has prepared five fire management categories for the district. The first, the "protected" category, states that fires on state and private lands will be put out immediately because of danger to life and property values. Only fires allowed under burning permits and air quality permits won't be suppressed.

Examples in this category are the Bull Lake Valley, the Troy Valley, and the Yaak River.

In the "operational" category are forested lands where management activities such as logging might take place. Unwanted fires will be

put out in these areas unless the fire fits a predetermined prescription and satisfies a management objective of the land use plan. Areas in this category include O'Brien Creek, Callahan Creek, or Spar Lake.

In the "~~operational~~ ^{observational}" category are forested lands where no management activities are planned. These lands include primitive recreation areas. Unwanted fires will be put out, while fires which satisfy a management objective will be allowed to burn. Examples in this category are the Cabinet Slopes, Scotchman and Lower Ross Creek.

Fire will assume a more natural role in the "wilderness" category. Nature-caused fires will be allowed to burn if they fit a predetermined prescription, and man-caused fires will be suppressed. Man-caused fires in a wilderness

area must be put out, according to the Wilderness Act of 1964. The fire management category in this category is the Cabinet Mountains Wilderness.

In the "special" category are forested lands designated for special uses such as the Ross Creek Scenic Area and campgrounds. Unwanted fires will be put out, and fires which fit management objectives will be allowed to burn.

Kathy Davis explained that there are many factors which affect a decision to fight a fire or let it burn in these categories. If anyone is in danger or property might be damaged because of the fire, it will be suppressed, she said.

If the fire is throwing embers in other areas and starting other fires, or if wind caused the fire to go out of control, the fire will be put out. Fire weather will also affect the decision to fight a fire, especially if hot, dry weather

continues during a fire and there is a chance the fire can go out of control.

Inversions or cloudy days which might cause smoke to be trapped in populated areas will affect fire plan decisions, and if the fire fits a management objective of a land use plan, it will be allowed to burn.

To prepare a fire plan for the Troy District, Ms. Davis studied the causes of fire on the district, studied other fire management plans in existence (there are only five), studied the ecological history of past fires to determine what influence fire has had on vegetation in the past, and used land use plans to determine the management objectives of the various areas in the district.

Dan Bailey, the Fire Management Officer for the Troy District, said that the fire plan and the Forest Service

change in policy may reduce the cost of fire management.

"But it will still be difficult to change attitudes overnight," he said. "It will be an ongoing process of telling people from the Troy-Libby area about the policy and getting them involved in the planning process."

¹⁶³⁰*Northern region*
NEWS FOR FOREST SERVICE EMPLOYEES

January 23, 1979

No. 2

Missoula, Montana

TROY RD FIRE MANAGEMENT ORGANIZATION, Kootenai NF, is in the process of developing a new fire management plan for the Troy District. "There is a difference between a fire management plan and a fuel management plan," explains Kathy Davis, fire management specialist. "A fire management plan refers to plans which include fire considerations in land and resource management and which develop fire-related activities or prescriptions to support management objectives. A fuel management plan is a site specific plan that deals with fuel management needs and opportunities for a specific parcel of land. Ideally, a fuel management plan defines a treatment for fuels based on information provided by a fire management plan," she said.

The revised fire management policy (February 1978) requires that fire management planning be totally integrated into the Forest Service land management planning process. The new fire management plan for the Troy District will provide information for the following plans: pre-attack, fuel management, wilderness fire management, fire prevention, recreation management, wildlife management, smoke management, prescribed burning, preparedness, timber management, and District dispatching.

District Ranger Bjorn Dahl and Fire Management Officer Dan Baily report the final draft will be completed by June 1979.

Troy Fire Plan Is Popular Book

The Troy Ranger District of the Kootenai National Forest has an unlikely "best seller" on their hands—it's a fire management plan for the district.

What makes the plan unique is that it is the only fire management plan on the Kootenai National Forest and one of the few fire management plans in the country.

Written by Kathy Davis, Troy's Fire Management Specialist, about 75 copies of the plan are being circulated in the Pacific Northwest and the Intermountain area. According to Dan Bailey, fire management officer for the Troy District, approximately 200 people have read the plan.

The plan came about because of a new Forest Service policy allowing fire to play its role as a natural force in the life of a forest. By 1983 all national forests will have such a plan.

Presently, the Troy fire management plan is going through a reviewing process at the Forest Service. The Kootenai National Forest Supervisor must review the plan and make his recommendations to the Regional Forester, in Missoula, who must approve or disapprove the plan by March 20. If Torheim approves, the plan will go into effect April 1.

In the plan, factors which affect the behavior of a fire are looked at more closely than in the past. For instance, unless a fire jeopardizes life or property values, or unless weather conditions cause smoke to be trapped in populated areas, the decision might be made to allow the fire to burn.

And land use plans of the forest will also have an effect on the decision to suppress the fire or allow it to burn. On forested lands where management activities such as logging are taking place, fires will be put out unless they satisfy predetermined management objectives.

If hot, dry weather continues

for several days during a fire, or if winds begin to make a fire unmanageable, a decision will be made to put out a fire.

Making that decision will be a committee composed of the district's fire management officer, silviculturist, and a resource manager. The district ranger will have final approval over that decision.

According to Fire Management Officer Bailey, "About 99 percent of the comments about the plan have been favorable. Most of the people who initially oppose the plan support the plan after they have learned more about it."

Fire Plan Developed

Troy RD Fire Management Organization, Kootenai National Forest, is in the process of developing a new fire management plan for the Troy District.

"There is a difference between a fire management plan and a fuel management plan," explains Kathy Davis, fire management specialist. "A fire management plan refers to plans which include fire considerations in land and resource management and which develop fire-related activities or prescriptions to support management objectives. A fuel management plan is a site specific plan that deals with fuel management needs and opportunities for a specific parcel of land. Ideally, a fuel management plan defines a treatment for fuels based on information provided by a fire management plan," she said.

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District Ranger Bjorn Dahl and Fire Management Officer Dan Baily report the final draft will be completed by June 1979.

**APPENDIX K. Troy Ranger District Wildlife Browse
Burning Program**

UNITED STATES DEPARTMENT OF AGRICULTURE
FOREST SERVICE

ENVIRONMENTAL ASSESSMENT REPORT

TROY WILDLIFE BROWSE BURNING PROGRAM
(In Coordination with Kootenai Land Use Plans
and Troy Fire Management Plan)



Kootenai National Forest
Troy Ranger District
February 1979

ENVIRONMENTAL ASSESSMENT REPORT 1/

TROY WILDLIFE BROWSE BURNING PROGRAM
Kootenai National Forest
Troy Ranger District
Lincoln County, Montana

Lead Agency:

USDA - Forest Service, Kootenai N.F.
Troy Ranger District
P.O. Box E
Troy, MT 59935

Phone: 295-4693

Consulting Agencies:

Montana Fish and Game Department
Libby Field Station
Fish Hatchery Road
Libby, MT 59923

Phone: 293-7639

Northern Forest Fire Laboratory
Drawer G
Missoula, MT 59801

Responsible Official:

Floyd J. Marita
Forest Supervisor
Kootenai National Forest

Abstract:

This Environmental Assessment Report describes 2 alternatives regarding the treatment of existing big game winter and spring forage areas. The Forest Service preferred alternative is identified. Included are the reasons for the determination that an environmental statement will not be made.

RECORD OF DECISION

Proposed project: Troy Wildlife Browse Burning Program
Ranger District: Troy Ranger District
Report Prepared By: Ron Hvizdak
Forestry Technician (Fire Management)

District Interdisciplinary Review

<u>Name</u>	<u>Title</u>	<u>Date</u>
1. <i>Ann Bailey</i>	Fire Management Officer	<i>2/2/79</i>
2. <i>Steve Pong Sr. Hart</i>	Silviculturist	<i>3/16/79</i>
3. <i>Charles S. Jones</i>	Resource/Timber Forester	<i>2-9-79</i>
4. <i>Robert Haul</i>	Other Resources Forester	<i>2-12-79</i>

Approved By:

Bjorn Dahl
Bjorn Dahl
District Ranger
Date *3/19/79*

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ENVIRONMENTAL ASSESSMENT REPORT

TROY WILDLIFE BROWSE BURNING PROGRAM

I. INTRODUCTION

A. Summary

Past wildfires are responsible for many of the brushfields on the District. These brushfields have provided browse for big game such as deer, elk, bighorn sheep and moose (Leege, 1968). Many of these areas, especially those with southerly, westerly or flat exposures are habitually utilized during winter and spring by big game. These areas provide food, thermal protection and shallow snow depths. In recent years, however, man has protected most of these areas from wildfire through aggressive suppression action. As a consequence, much of the browse has become decadent, unavailable, or crowded out by trees because of successional advances.

A decision must be made as to what can be done with these winter and spring ranges to help maintain them as forage areas for big game.

B. Location

The areas with which this program is concerned are the winter and spring ranges on the Troy Ranger District, Kootenai National Forest. These areas lie in Boundary and Bonner Counties in Idaho and Lincoln County, Montana.

C. Land Use Allocations

Winter and spring ranges on the Troy District are contained within the following planning units: O'Brien, Cross Mountain, Star, Callahan, Keeler and Bull Lake. According to the Kootenai National Forest's Land Use Plan, these game ranges fall within the land allocations of wildlife, Wildlife/Timber/Viewing.

D. Major Concerns

1. Air quality may be affected if a burning program is established.
2. Some of the areas can be viewed from the Federal and State Highways on the District.
3. Some of the game ranges are located in close proximity to State or private land.

II. AFFECTED ENVIRONMENT

A. Land Ownership and Status

Some winter and spring game ranges in the Troy area are on private land. Thus, some of these ranges are adjoining the ranges on Forest Service land.

B. Soil

Program area elevations range from 1900 feet to 4400 feet. Topography is characterized by moderate to steep slopes with scattered benches. Aspects are south, southwest and west. A general assessment of the soil stability in the game ranges is that they are variable. Most soils are moderately shallow with rock content about 40-60 percent. Rock outcrops are common.

C. Vegetation

1. Commercial Species

Douglas-fir is the predominant species with ponderosa pine ranking second. Associated species include lodgepole pine, western larch and grand fir. The stands are chiefly old growth (150+ years). In some areas, younger classes of Douglas-fir and ponderosa pine are intermingled with the old growth trees. Winter and spring game ranges are generally open stands with crown cover ranging from 25-75%.

2. Ground Vegetation

The open stands of timber allow more sunlight to reach the forest floor. Most shrubs and grasses are shade-intolerant and with added sunlight they tend to thrive in open stands. Many of these species are utilized by big game. Some of the more important plants include redstem ceanothus, service berry, pachistima or mountain lover, blue huckleberry, willow, mountain maple, kinnickinnick, bluebunch wheatgrass, elk sedge and other grasses and sedges. Not all shrubs found on these ranges are preferred food species by big game. Species that are often present but receive little or no utilization include ninebark, oceanspray and white spirea.

D. Hydrology

The majority of the streams in the proposed areas are Class III and higher. Generally, they are intermittent. There is winter and spring ranges along the Yaak River and Kootenai River.

E. Wildlife

Big game found in the proposed areas consist mainly of elk, whitetailed deer, mule deer, bighorn sheep, moose, black bear, grizzly bear, cougar, bobcat and coyote.

Common small non-game animals consist of red squirrels, Columbia ground squirrels, chipmunks, snowshoe hares, mice and shrews.

Birds commonly found include ruffed grouse, ravens, chickadees, nuthatches, pileated woodpecker, hairy woodpecker, downy woodpecker and red tailed hawk. Bald eagles, golden eagles and osprey may be seen along the Kootenai and Yaak Rivers.

F. Fisheries

The boundaries of some game ranges occur next to fish bearing streams such as the Kootenai and Yaak Rivers. The majority of the streams occurring on winter and spring ranges do not support fish.

G. Range

The area does not provide suitable range for domestic animals.

H. Visual

Some of the winter and spring ranges are within view of U.S. Highway #2, State Highway 56 or State Highway 508.

I. Fire and Fuels

Many of the winter and spring big game ranges came about because of the effects of past wildfires. Both man-caused and natural fires have been of low magnitude since fire suppression activities were initiated by the Forest Service.

Fuel loadings are light (3 to 10 tons per acre). Most of the fuel consists of grass and brush with few scattered branches and blow-down trees.

J. Recreation

Most of the recreation occurs either during the berry picking season or hunting seasons. Most of the use is along established roads, although some people do get out into the areas on foot. There are a few established trails and old trails existing on some of the ranges.

K. Air Quality

The State of Montana has standards for air quality which are followed by State and Federal government agencies. The air quality and visibility is sometimes reduced by burning.

L. Endangered Species

The endangered bald eagle occurs in the proposed areas. Grizzly bear, a threatened species, also use these areas.

TABLE I

SCIENTIFIC NAMES OF COMMON PLANTS
AND ANIMALS MENTIONED IN THIS EARA. PLANTS

1. Douglas-fir	<i>Psuedotsuga menziesii</i>
2. Ponderosa pine	<i>Pinus ponderosa</i>
3. Lodgepole pine	<i>Pinus contorta</i>
4. Western Larch	<i>Larix occidentalis</i>
5. Grand fir	<i>Abies grandis</i>
6. Redstem ceanothus	<i>Ceanothus sanguineus</i>
7. Service berry	<i>Amelanchier alnifolia</i>
8. Pachistima	<i>Pachistima myrsinites</i>
9. Blue Huckleberry	<i>Vaccinium globulare</i>
10. Willow	<i>Salix</i> spp.
11. Mountain maple	<i>Acer glabrum</i>
12. Kinnickinnick	<i>Arctostaphylos uva-ursi</i>
13. Bluebunch wheatgrass	<i>Agropyron spicatum</i>
14. Elk sedge	<i>Carex rubescens</i>
15. Various sedges	<i>Carex</i> spp.
16. Ninebark	<i>Physocarpus malvaceus</i>
17. Oceanspray	<i>Holodiscus discolor</i>
18. White Spirea	<i>Spirea betulifolia</i>
19. Queen's cup deadly	<i>Clintonia uniflora</i>

B. ANIMALS

1. Elk	<i>Cervus canadensis</i>
2. Whitetailed deer	<i>Odocoileus virginianus</i>
3. Mule deer	<i>Odocoileus hemionus</i>
4. Bighorn sheep	<i>Ovis canadensis</i>
5. Moose	<i>Ursus americanus</i>
6. Grizzly bear	<i>Ursus arctos horribilis</i>
7. Cougar	<i>Felis concolor</i>
8. Bobcat	<i>Lynx rufus</i>
9. Coyote	<i>Canis latrans</i>
10. Red squirrel	<i>Tamiasciurus hudsonicus</i>
11. Columbian Ground Squirrel	<i>Citellus columbianus</i>
12. Chipmunks	<i>Eutamias</i> spp.
13. Snowshoe hare	<i>Lepus americanus</i>
14. Mice	Various genera
15. Shrews	Various genera
16. Ruffed grouse	<i>Bonasa umbellus</i>
17. Ravens	<i>Corvus corax</i>
18. Black-capped chickadee	<i>Parus atricapillus</i>
19. Whitebreasted nuthatch	<i>Sitta carolinensis</i>
20. Pileated woodpecker	<i>Dryocopus pileatus</i>
21. Hairy woodpecker	<i>Dendrocopos villosus</i>
22. Downy woodpecker	<i>Dendrocopos pubescens</i>
23. Red-tailed hawk	<i>Buteo jamaicensis</i>
24. Bald eagle	<i>Haliaeetus leucocephalus</i>
25. Golden eagle	<i>Aquila chrysaetos</i>
26. Osprey	<i>Pandion haliaetus</i>

III. ALTERNATIVES CONSIDERED

- A. Implement the proposed Troy Wildlife Browse Burning Program.
- B. Leave the winter and spring ranges as they are. No action.

IV. EVALUATION OF ALTERNATIVES

A. Troy Wildlife Browse Burning Program

1. Purpose and Objectives

- a. This program will increase browse production, availability and palatability for a variety of big game such as deer, elk, bighorn sheep and moose through the natural role of fire. Periodic burning in these foraging areas will allow maintenance of palatable species. Burning will also help produce food for non-game species. An increase in shrub and grass production will provide food for birds and small mammals.
- b. This program will help reduce the build-up of fuels on the areas to be burned.
- c. This program will contribute to a portion of the Forest Goals and Objectives to improve wildlife habitat by providing increased nutritional forage.

B. Leave Ranges As They Are

By not developing a long range burning program for these areas, browse and herbaceous plants will become decadent, unavailable or suppressed by trees because of successional changes. A decline in the quality and quantity of palatable plants will undoubtedly result in reduced big game, bird and small mammal populations. At present, big game populations are already declining and the poor quality of palatable plants may be one of the reasons.

V. PREFERRED ALTERNATIVE IDENTIFICATION

Alternative A: Troy Wildlife Browse Burning Program

A. Fire Prescription for Underburning

1. Desired Accomplishment

Grasses, forbs and legumes should be burned off at or near the

ground line. This can be accomplished by burning when the duff and soil moisture is still relatively high (25-45% for soil, 60-75% for duff). Production of 30-40% bare mineral soil is desired to improve germination and seedling establishment conditions in order to increase grass, forb and legume production. Browse producing shrubs should be burned off at or near the ground line also. These shrubs sprout rapidly following rainfall after a quick, hot fire.

2. Desired Fire Behavior

Fuels in these areas are usually light (less than 10 tons/acre), thus, a relatively hot fire moving fast enough to consume all dead grass and shrubs is required. Fuel moisture content should be about 13 percent for light fuels to assure good combustion and lessen the chance for smoldering fires.

3. Required Environmental Conditions

Based upon the results obtained in similar habitat types, the following conditions should be adhered to for best results:

a. Fuel Moisture Content

Dead Grass: 6-8%
0 to $\frac{1}{4}$ " Fuels: Less than 13%
Soil: 25-45%
Duff: 60-75%

b. Wind Direction

Generally uphill and steady.

c. Air Temperature

50 degrees to 65 degrees in order to dry grass to the desired moisture content.

d. Relative Humidity

Between 35 and 45%.

4. Preburn Monitoring

If burning is to be done in spring some monitoring will be necessary to determine if all snow is off the proposed burn area. Once the area is free of snow, at least 2 days of sunshine with temperatures of 45 degrees or more should pass before fuel and soil moisture samples are taken.

Before burning, whether in spring or fall, fuel and soil samples will be collected periodically to determine when the desired conditions have been reached. After collection, all fuel and soil samples will be weighed, oven-dried and weighed again to assess them for moisture content. Relative humidity, wind direction and speed, and air temperature will also be taken in conjunction with fuel and soil samples. All of the samples will be taken as close to the planned hour of ignition as possible.

5. Ignition Technique

The strip head firing technique will be used to burn the majority of the areas. Smaller strips of about five to ten feet will be used at the top of the units to keep the burn within unit perimeters. As lighting progresses down the slope, the strips should be widened to fifteen to thirty feet or more depending on the behavior of the fire.

6. Ignition Methods

Hand held or flying drip torch will be used depending upon each individual situation.

B. Burning Plan

A burning plan will be written for each area.

1. Holding

No holding should be necessary. Most burns will take place when the surrounding aspects still have sufficient snow to stop a ground fire. Therefore, no equipment or supplies should be necessary for holding. A contingency plan will be included in each burn plan.

If the burning takes place in the fall, holding still should be a minimal problem because of the habitat types. The surrounding areas should have sufficient moisture remaining from the fall rains.

Escapes are not expected to be a problem because of the time of year and the habitat types. Should any serious escapes occur (potential crowning in adjacent areas) they will be suppressed as rapidly as possible.

Minor escapes (ground fires) will be allowed to burn except when endangering state or private lands. A tanker with fire fighting equipment may be desired to stand by in areas that appear to have potential for unwanted spread.

2. Mop-Up

No mop-up will be planned because the fuels are light and should not "lay over". Unless problems develop, no equipment or supplies should be necessary for mop-up.

C. Effects of Implementation

Alternative A:- Troy Wildlife Browse Burning Program

1. Land Ownership and Status

Portions of the program areas will be adjacent to private land. Property lines will be located prior to burning in such cases. Nearby landowners will be contacted to explain why the project is being carried out and what the expected benefits are. Input from these landowners will also be welcome. Care will be used when burning near private land.

2. Soil

The management objective for soil is for the burning to produce 30 to 40 percent bare mineral soil to improve germination and seedling establishment conditions. By doing this the soil may be more susceptible to erosion. But this should only be temporary because new growth will sprout rapidly after post-burn rainfall. The increased growth will then hold the soil better in the future. The burn itself will actually improve the nutrient content of the soil, also.

3. Vegetation

Douglas-fir and ponderosa pine are very fire resistant when mature because of their thick bark. Therefore they lend themselves nicely to burning. A few of the younger age class trees may be killed from the burns.

Timber resources may be affected depending on fire prescription and conditions existing on the ground. Under the Land Use Plan, however, many of these areas are to be managed to maintain or enhance big game winter forage production and cover. Therefore, browse production may be of more importance than timber production.

It has been found that shrubs and grasses take over immediately after fire (Leege, 1968). These plants tend to grow faster and are higher in nutrient content. (University of Idaho, 1973). Miller (1977) found that, if burned under the right conditions, blue huckleberry responds very well after fire. Leege (1968) had similar conclusions with most browse species used by big game.

4. Hydrology

Minimal long-termed impact is expected from the program, because browse species will sprout from established root systems, and herbaceous growth will be stimulated, following post-burn precipitation. The new growth will be more vigorous and plentiful than before burning (Lyon, 1966).

5. Wildlife

Big game such as deer, elk, sheep and moose will benefit from the program through increased browse production and improved availability. Brushfields also harbor insects which are fed upon heavily by birds including young grouse in the spring and early summer. Increased grass and shrub production will result in more food and cover for birds and small mammals.

No lasting harmful impacts are expected on most non-game animals and birds. The shrubs and grasses which are used for food and cover will return rapidly.

The improved browse condition will greatly benefit females prior to calving, fawning or lambing. It is during this time that they need to build up their strength the most. Care will be taken to make sure that a burn does not take place in calving, fawning or lambing areas while the females are having their young.

6. Fisheries

No impacts anticipated.

7. Range

No impacts anticipated.

8. Visual

Pockets of small trees may be scorched during the burning operations. In areas with viewing considerations in the Kootenai National Forest Land Use Plan, trees killed by scorching could be cut following the burn if felt necessary.

Visual impact of the burn will be short lived, because resprouting is rapid after spring burning. Areas burned in the fall will be covered by winter snows, and in the spring the new growth will be rapid.

9. Fire and Fuels

Fuel hazard will be reduced by eliminating much of the fuels on the areas.

10. Recreation

A long range impact on recreation is hopeful to improve the quality and quantity of big game animals through improved vegetation. This will be of benefit to hunters using the areas.

Sightseers and animal watchers may also benefit if the improved vegetation condition attracts more small non-game birds and mammals.

11. Air Quality

All burning will take place only during periods of good smoke dispersal, making sure that the Montana State Air Quality Requirements are met. Visibility will be reduced and air quality will be impacted but only for short duration if burned during the right conditions. Smoke duration should be short since fine fuels burn out quickly.

12. Endangered Species

Since grizzly bear use big game winter and spring ranges, they will also benefit from the improved vegetal condition.

There is no anticipated impact on bald eagles.

Provisions for the protection of any endangered species will be made regardless of what point during the life of the program they are found.

Alternative B: No Action

1. Land Ownership and Status

No impacts anticipated.

2. Soil

No impacts anticipated.

3. Vegetation

Through natural successional advances trees will suppress much of the shrubs and grasses. The shrubs and grasses that remain will become decadent and unavailable for wildlife utilization.

4. Hydrology

No impacts anticipated.

5. Wildlife

If the browse plants remain decadent and continue to become suppressed by trees through successional advances, the populations of big game, birds and small mammals will likely decline.

6. Fisheries

No impacts anticipated.

7. Range

No impacts anticipated.

8. Visual

No impacts anticipated.

9. Fire and Fuels

Fuels will build-up naturally over time and increase the potential for a destructive wildfire during a dry season.

10. Recreation

No impacts anticipated.

11. Air Quality

No impacts anticipated.

12. Endangered Species

Grizzly bear also utilize the big game winter and spring ranges. Thus, the continued decline in quality and quantity of palatable plants will undoubtedly have adverse effects on the status of the grizzly bear.

VI. REMARKS

Documentation of browse burning in this area is lacking. Many of the big game winter ranges are of the Douglas-fir/Ninebark (PSME/PHMA) habitat type. Other habitat types found on the winter and spring ranges are Douglas-fir/Kinnickinnick (PSME/ARUV), Douglas-fir/bluebunch wheatgrass (PSME/AGSP) and grand fir/queen's cup beadlily (ABGR/CLUN).

It is hoped that the burns will retard much of the ninebark on the areas, yet increase the response of the better browse species. In order to do this, a quick hot fire is needed.

Browse burning is usually done in the spring which gives the area time to recover so wildlife can use it the following winter. The burns are also easier to control because snow may still be present outside the area to be burned, providing a fuelbreak. Although it has been recommended that browse burning be done in the spring, situations may arise when better results can be obtained by burning in late summer and fall. One major drawback toward burning during this time of year is that the area burned will not serve as a forage area during the immediately following winter. This can be counteracted by burning a small section of the range one year, another section of the range the next year, etc., so only a portion of the area is unavailable during a given winter. Improving browse availability and productivity are the primary objectives of this program.

This may necessitate that a small portion of the range may be unavailable for one winter to benefit more wildlife in the long run.

Another drawback to late summer and fall burning would be the increased possibility of escaped fires. However, nature has demonstrated that fire improves wildlife habitat. Therefore, if a fire escapes the proposed boundaries, whether in spring, summer or fall, an escaped fire situation analysis will be made in order to determine the most cost effective and environmentally sound suppression action to be taken.

The burning program should be continued on a rotation basis. Once a unit has been burned it should be burned again 10 to 15 years later to maintain the range. Each area should be studied to determine exactly when to burn again. More documentation and research information is needed to determine the burning rotation.

Pre-burn and post-burn monitoring research is greatly needed. Measurements should include plant species composition, browse availability, browse utilization, browse response to burning in spring vs. fall, nutrient uptake of plants, wildlife responses and carrying capacities.

This burning program is planned through the fiscal year 1985. More units may be added or deleted after more on-the-ground studies have been made. The boundaries of the units are flexible, and the attached photos and overlays show rough boundaries. The specific area to be burned will be determined prior to the burning.

Wildfires often burn and are often patchy and do not consume everything. Often, islands of trees and/or shrubs are left untouched in the middle of burns. This should be considered when burning wildlife ranges. If patches of young Douglas-fir and ponderosa pine are within the planned burn, it may be better to avoid burning them. This may be especially desirable in areas that are lacking thermal cover. The assistance of the Forest Wildlife Biologist will be used in these cases.

When the Land Use Plans were made, many big game winter and spring ranges were either incorrectly inventoried or were not given on-the-ground inspection. Thus, there are many areas on the Troy District which are not given wildlife consideration, even though they are presently being used by game during the winter and spring months. While this browse burning program was being prepared, many areas were found and added to the District Big Game Winter and Spring Range Atlas. These areas should be added to the wildlife areas under the Land Use Plans. Until they are, the Big Game Range Atlas should be used to determine if an area is to be given wildlife consideration.

The Troy Ranger District Fire Management Plan allows for natural fires to burn in winter and spring ranges under certain conditions (Davis, 1979). The Fire Management Plan could compliment this plan by letting nature do what is planned here. Table II lists the maximum acreages that should be allowed to burn under the Fire Management Plan for each winter and spring range. This is to insure that the entire winter range is not burned in one season.

Attached is a series of photos of areas planned for burning through 1985. The units to be burned are laid out on overlays and are color-coded according to the years they are planned for burning.

Also attached is a year-by-year list of the units planned for burning, starting with 1979 and ending with 1985. Each yearly list shows the area to be burned, the units within the area, their corresponding number, acreage and the total acreage for each area. The unit numbers on these lists correspond to the photos and overlays.

Funding for this program may be a problem at times. If for some reason enough funds are not available to complete the burning planned for a particular year, or if weather prohibits ideal burning conditions, the remaining units will be burned the following year. Coordination with other management activities should be done to try to increase available funds. For example, K-V funds may possibly be used if there is a timber sale in the area.

TABLE II

Suggested Maximum Allowable Acreages To Be Burned
Under The Troy District Fire Management Plan

<u>Pine Creek Operational Fire Management Area</u>	<u>79</u>	<u>80</u>	<u>81</u>	<u>Year</u>				<u>85</u>	<u>Total</u>
				<u>82</u>	<u>83</u>	<u>84</u>			
Yaak Canyon	250	250	300	250	100	50	50		1250
Ferrel Creek	150	100	25	50	50	25	25		425
Teepee Mountain	350	150	150	125	100	100	100		1075
Haystack	25	150	25	25	100	150	150		625
Pine Creek	50	25	150	75	250	25	50		625
Kingsley Creek	<u>25</u>	<u>25</u>	<u>25</u>	<u>25</u>	<u>75</u>	<u>25</u>	<u>50</u>		250
Yearly Total	850	700	675	550	675	375	425		

TABLE II (Cont.)

<u>O'Brien Creek Operational Fire Management Area</u>	<u>79</u>	<u>80</u>	<u>81</u>	<u>Year 82</u>	<u>83</u>	<u>84</u>	<u>85</u>	<u>Total</u>
Sheep Range	400	350	350	300	50	50	100	1600
Sears Flat	50	200	75	25	25	25	25	425
Suprise Gulch	150	75	100	25	25	25	25	425
Yaak Mountain	25	150	50	150	25	250	25	675
Rabbit-Lynx	25	200	25	25	250	150	250	925
<u>Yearly Total</u>	<u>650</u>	<u>975</u>	<u>600</u>	<u>525</u>	<u>375</u>	<u>500</u>	<u>425</u>	
<u>Madge Creek Operational Fire Management Area</u>								
Camp Creek	100	100	150	25	25	25	25	450
<u>Callahan Creek Operational Fire Management Area</u>								
Callahan	50	75	300	75	50	50	50	650
<u>Spar Lake Operational Fire Management Area</u>								
Ross Creek	250	250	300	200	100	50	100	1250
Thicket Creek	0	0	0	100	150	25	25	300
<u>Yearly Total</u>	<u>250</u>	<u>250</u>	<u>300</u>	<u>300</u>	<u>250</u>	<u>75</u>	<u>350</u>	
<u>Star Creek Operational Fire Management Area</u>								
Ruby Creek Loop	25	125	25	100	25	25	25	350
Star Creek	25	25	50	25	25	50	25	225
<u>Yearly Total</u>	<u>50</u>	<u>150</u>	<u>75</u>	<u>125</u>	<u>50</u>	<u>75</u>	<u>50</u>	
<u>Keeler Creek Operational Fire Management Area</u>								
Copper Mountain	25	100	25	350	25	25	50	600
Grouse Mountain	25	100	250	150	125	25	50	725
<u>Yearly Total</u>	<u>50</u>	<u>200</u>	<u>275</u>	<u>500</u>	<u>150</u>	<u>50</u>	<u>100</u>	

VII. CONSULTATION WITH OTHERS

Forest Service personnel were involved in planning and review. The following people were major contributors:

- A. Dan Bailey - District FMO
- B. Rick Carlson - District AFMO
- C. Kathy Davis - Fire Planning Specialist
- D. Bob Klarich - Other Resource Forester
- E. George Gruell - Research Wildlife Biologist, Northern Forest Fire Laboratory
- F. Bill Ruediger - Kootenai N.F. Wildlife Biologist
- G. Denis Hart - District Silviculturist
- H. Chuck Jones - Resource Forester
- I. Bjorn Dahl - District Ranger

VIII. MANAGEMENT REQUIREMENTS, CONSTRAINTS AND MITIGATING MEASURES

- A. If such things as nesting sites for endangered or unique animals are found, or if endangered plants are found, the District Staff should be notified so that protective measures can be taken for their protection.
- B. Burning will be done in accordance with smoke management guidelines, and the Montana State Air Quality Requirements will be met.
- C. Burns will take place under such conditions that any adjacent State or private land will be protected.
- D. Burning plans will be written prior to each burn.
- E. Units posing complex burning conditions will not be burned until the Forest Wildlife Biologist or the Montana Department of Fish and Game has been consulted.
- F. Burns will not take place in calving, fawning or lambing areas while the females are having their young.

IX. FINDING OF NO SIGNIFICANT EFFECT

This finding covers the Troy Wildlife Browse Burning Program on the winter and spring ranges on the Troy District, Kootenai National Forest. Consideration was given to all significant resources in planning and designing this program. There was no indication that there will be any significant effects upon the human environment, therefore, an Environmental Statement will not be made.

Factors considered in making the determination include:

- Resprouting will be rapid
- Steps will be taken to follow Montana State Air Quality Requirements
- No unique or rare resources within the areas will be adversely affected.

Comments regarding this finding should be sent to:

Kootenai National Forest
Troy Ranger Station
P.O. Box E
Troy, MT 59935

Responsible Officer

Date

LITERATURE CITED

- Davis, K.M. 1979 - Troy Ranger District Fire Management Plan, Unpublished.
- Leege, T.A. 1968 - Prescribed Burning for Elk in Northern Idaho. Tall
Timbers Fire Ecol. Conf. Proc. 8:235-254.
- Lyon, L.J. 1966 - Initial Vegetal Development Following Prescribed Burning
of Douglas Fir in South-Central Idaho. USDA Forest Service
Res. Paper INT-29, Intermt. Forest & Range Exp. Stn., Ogden.
- Miller, M 1977 - Response of Blue Huckleberry to Prescribed Fires in a
Western Montana Larch-Fir Forest. USDA Forest Service
Paper INT-188, Intermt. Forest & Range Exp. Stn., Ogden.
- University of Idaho 1973 - Annual Report, Forest, Wildlife and Range
Exp. Stn., Moscow.

X. APPENDIX

- I. COMMENTS AND SUPPORT**
- II. YEARLY LISTS OF UNITS**
- III. AERIAL PHOTOS AND OVERLAYS**

INT Missoula NFFL

REPLY TO: 5100 Fire Management
2620 Planning

February 9, 1979

SUBJECT: Troy Ranger District EAR on Wildlife Browse Burning
Program

TO: Ron Hvizdak, Forestry Technician
Troy Ranger District



I am returning your draft with some suggested edits which may help in bringing out your meaning more clearly. I think you have the basis for a good report, but it needs further refinement. I am sure this will be accomplished following review by the Forest wildlife biologist and others.

The only comment I have on content concerns the burning of conifers. In my view, prescriptions should include burning low quality, marginal timber. We should also be burning doghair stands where there is adequate thermal cover nearby.

It appears that this EAR relates quite well to the Troy District Fire Management Plan. These plans should complement one another and lead to considerable improvement in winter and spring ranges during the coming years.

If you have any questions about my comments let me know.

George E. Gruell

GEORGE E. GRUELL
Research Wildlife Biologist

Enclosure

FISCAL YEAR 1979

TOTAL ACREAGE = 1042

	<u>YAAK CANYON</u>	<u>ACREAGE</u>	<u>CAMP CREEK</u>	<u>ACREAGE</u>
Unit#	2	29	1	20
	3	70	2	7
	4	58	3	17
	Total	157	4	19
			Total	63
	<u>SHEEP RANGE</u>		<u>SURPRISE GULCH</u>	
	2	44	1	91
	3	29		
	4	120		
	5	52		
	Total	245		
	<u>CALLAHAN</u>			
	1	17		
	<u>FERREL CR.</u>			
	1	54		
	<u>TEPEE MTN.</u>			
	1	255		
	<u>SEARS FLAT</u>			
	1	20		
	<u>ROSS CR.</u>			
	1	125		
	2	15		
	Total	140		

FISCAL YEAR 1980

TOTAL ACREAGE = 1377

<u>YAAK CANYON</u>		<u>ACREAGE</u>	<u>YAAK MTN.</u>		<u>ACREAGE</u>
Unit#	5	101	1		128
	6	13			
	7	10		<u>ROSS CR.</u>	
	Total	124	3		49
			4		30
<u>SHEEP RANGE</u>			5		70
	6	200		Total	149
	7	7			
	8	3		<u>CAMP CR.</u>	
	Total	210	5		62
<u>CALLAHAN</u>			<u>SURPRISE GULCH</u>		
	2	39	2		39
<u>FERREL CR.</u>			<u>RABBIT CR. & LYNX CR.</u>		
	2	16	1		141
	3	12			
	4	25		<u>RUBY CR. LOOP</u>	
	Total	53	1		68
<u>TEPEE MTN.</u>			<u>COPPER MTN.</u>		
	2	94	1		7
			2		33
<u>SEARS FLAT</u>				Total	40
	2	94			
<u>HAYSTACK</u>			<u>GROUSE MTN.</u>		
	1	77	1		13
			2		20
			3		17
				Total	50

FISCAL YEAR 1981

TOTAL ACREAGE = 1353

	<u>YAAK CANYON</u>	<u>ACREAGE</u>		<u>ROSS CR.</u>	<u>ACREAGE</u>
Unit#	8	29		6	128
	9	39		7	19
	10	<u>122</u>		8	12
	Total	<u>190</u>		9	15
				10	<u>16</u>
	<u>SHEEP RANGE</u>			Total	<u>190</u>
	9	58			
	10	45		<u>CAMP CREEK</u>	
	11	<u>106</u>		6	109
	Total	<u>209</u>			
	<u>CALLAHAN</u>			<u>SUPRISE GULCH</u>	
	3	46		3	52
	4	<u>136</u>		<u>PINE CREEK</u>	
	Total	<u>182</u>		1	9
	<u>TEPEE MTN.</u>			2	17
	3	88		3	<u>36</u>
				Total	<u>62</u>
	<u>SEARS FLAT</u>			<u>STAR CR.</u>	
	3	17		1	26
	4	<u>22</u>			
	Total	<u>39</u>		<u>GROUSE MTN.</u>	
	<u>YAAK MTN.</u>			4	151
	2	46		5	<u>9</u>
				Total	<u>160</u>

FISCAL YEAR 1982

TOTAL ACREAGE = 1122

	<u>YAAK CANYON</u>	<u>ACREAGE</u>		<u>ROSS CR.</u>	<u>ACREAGE</u>
Unit#	11	43		11	94
	12	13		12	32
	13	10			Total 126
	14	13			
	15	9		<u>PINE CR.</u>	
				4	13
	('78 #1)	45		5	17
	Total	133			Total 30
	<u>SHEEP RANGE</u>			<u>RUBY CR. LOOP</u>	
	12	90		2	9
				3	17
	('78 #1)	100		4	4
	Total	190		5	12
	<u>CALLAHAN</u>				Total 42
	5	33			
	<u>FERREL CR.</u>			<u>COPPER MTN.</u>	
	5	29		3	233
	<u>TEPEE MTN.</u>				
	4	68		<u>GROUSE MTN.</u>	
				6	41
				7	36
					Total 77
	<u>YAAK MTN.</u>			<u>THICKET CR.*</u>	
	3	86		1	58
	4	17			
	Total	103			

*THICKET CR. Can be done sooner if sale is completed sooner

FISCAL YEAR 1983

TOTAL ACREAGE = 529

	<u>THICKET CR.</u>	<u>ACREAGE</u>
Unit#	2	44

PINE CR.

6	183
---	-----

KINGSLEY CR.

1	32
---	----

GROUSE MTN.

8	64
---	----

9	20
---	----

Total	84
-------	----

LYNX CR.

2	148
---	-----

HAYSTACK

2	38
---	----

* THICKET CR. Can be done sooner if sale is completed sooner

FISCAL YEAR 1984

TOTAL ACREAGE = 341

	<u>RABBIT-LYNX</u>	<u>ACREAGE</u>
Unit #	3	88

YAAK MTN.

5	181
---	-----

HAYSTACK

3	36
---	----

4	36
---	----

Total	<u>72</u>
-------	-----------

FISCAL YEAR 1985

TOTAL ACREAGE = 298

RABBIT-LYNX

4

ACREAGE

145

YAAK CANYON

16

58

PINE CR.

7

20

HAYSTACK

5

40

6

35

Total

75

WESTFORNET-Ogden
Int. rmountain For. & Range Expt. Stn.
507 25th St.
Ogden, UT 84401